WORLD'S POULTRY SCIENCE JOURNAL

JULY - SEPTEMBER

1953

Official Organ of the

WORLD'S POULTRY SCIENCE ASSOCIATION

Volume 9 - Number 3

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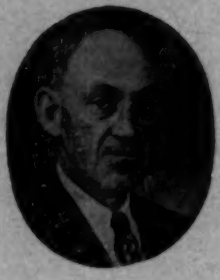

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WORLD'S POULTRY SCIENCE JOURNAL

Volume 9 July-Sept. Number 3

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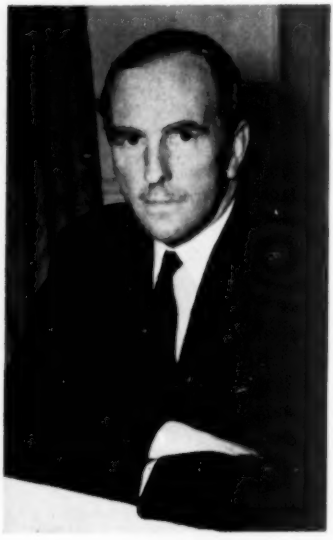
TENTH WORLD'S POULTRY CONGRESS

Message from The Rt. Hon. James Stuart, P.C., M.V.O., M.C., M.P. Secretary of State for Scotland

The Organizers of the Tenth World's Poultry Congress have invited me to become an Honorary President of the Congress and it has given me great pleasure to accept that office. Both in that capacity and as Secretary of State for Scotland I extend an invitation to all who are connected in any way with the poultry industry to come to Edinburgh in 1954 for this now well-established international occasion.



It is a prominent feature of the modern international scene that organizations sponsored by Governments exist to encourage greater prosperity through co-operation and sharing of information between nations. It is with genuine pleasure that Scotland welcomes the Congress of an organization which has worked voluntarily for more than forty years with the same object in view.

The products of the poultry industry now rank third in importance in the range of foodstuffs produced in Scotland. Great advances have been made by the industry in the last few years. Nevertheless a lot has yet to be done and learned in this country, and I hope that the gathering in Scotland of so many distinguished poultry experts will help and encourage this country's industry to still greater efforts. But Scotland has much to give, too, to the common store of knowledge. During the period of Congress, she will try to demonstrate through her research centres, institutes and modern poultry enterprises, her own contributions to the world-wide efforts to increase and improve the foodstuffs of the peopls of the world.

Let me assure all who intend to visit this country for the 1954 Congress that they will be made most welcome.

St. Andrews' House,
Edinburgh.
June, 1953.

James Stuart.

Message of invitation from the Congress Organization

The Congress Organization which has been set up by the Department of Agriculture for Scotland to assist in making all arrangements for the Tenth World's Poultry Congress which is being held in Edinburgh from 13th to 21st August, 1954, also extend a hearty invitation to you to participate in the Congress.

Many of the arrangements for the Tenth Congress are naturally as yet only at the preliminary stage but good progress is being made and the organizers are already confident that the Congress to be held in Edinburgh will be no less successful than its predecessors. Within the next month or two the Congress Preliminary Announcement will be issued. Meantime it can be said that so far as the work of the Congress is concerned, the programme will broadly be on similar lines to those of previous Congresses, that an Exhibition demonstrating all aspects of the poultry industry in Scotland will run concurrently with the Congress, that a series of interesting tours of Scotland is being arranged and that the social side of the Congress is not being overlooked. Immediately following the Congress there is due to take place in the City the Edinburgh International Festival of Music and Drama. Those attending the Congress will thus have the opportunity of taking part also in this world-famous Festival.

The Congress Organization would at this stage invite all those countries which intend to participate in the Congress to set up as soon as possible National Committees with whom the Congress Organization could communicate and who might assist by publicizing the Congress throughout their countries, encouraging participation in the Congress and receiving and selecting papers for submission to the Congress Organization. The names and addresses of the secretaries of the National Committees should be sent to the Congress Secretariat at St. Andrew's House, Edinburgh, 1.

Rules governing the presentation of Papers

It is none too early for those intending to submit papers for presentation at the Congress to start making their preparations. The Rules governing the presentation of papers are as follows:

1. The headings of the Sections at the Paper Reading Sessions will be those laid down by the World's Poultry Science Association as follows:

(a) Genetics and Breeding
(b) Physiology and Nutrition
(c) Diseases and their Control
(d) Economics and Marketing
(e) Husbandry and Miscellaneous

2. The National Committee in each country will receive Papers and decide whether or not to accept them for submission to the Congress Organization. In order to maintain a high standard, National Committees have been advised to appoint sub-committees from experts in the several fields to examine all Papers before they are allowed to go forward for acceptance. Authors from countries which do not have a National Committee should submit their application to present a Paper together with copies of the Paper direct to the Congress Organization.

3. It will be open for any person to submit a Paper to be read at the Congress whether or not he is a member of the World's Poultry Science Association.

4. Any person submitting a Paper should indicate whether or not he will attend the Congress in person to present it. In accepting Papers priority of acceptance will be given to those to be presented personally by the authors unless the Paper is of unusual quality and outstanding in facts or findings.

5. If the author is present he will be allowed to give only the resume of his Paper and to speak on it over a limited period of time.

6. In the exceptional case where an author is not able to present his Paper only some one closely associated with his work from the same research center, institute or firm, and nominated by the author, will be allowed to speak to it. In no case will some one not familiar with the work be allowed to do so.

7. A Paper should not exceed 3,000 words or be less than 1,500 words. It should be typewritten in duplicate in either of the official languages which are *English and French* and be accompanied by a resume not exceeding 300 words in the same language as that of the original Paper.

8. Drawings, graphs or charts may accompany Papers but they should be kept within moderate limits. Any person wishing to show a film illustrating his Paper or on some subject likely to be of interest to the Congress should intimate the title, size and approximate length of the film.

9. Titles of Papers proposed to be submitted should be sent to the Congress Secretariat before 31st October, 1953 and *all Papers must, without fail, be in the hands of the Congress Secretariat by 1st January*, 1954. The address is: *St. Andrew's House, Edinburgh*, 1.

10. The number of papers to be accepted will be restricted to 100. The Congress Organization reserve the right to edit

as they think proper all Papers selected for presentation.

11. The Congress Secretariat will supply reprints of a Paper, at the author's cost, if they are ordered at the time the Paper is submitted.

MEMBERSHIP FOR THE TENTH WORLD'S POULTRY CONGRESS

CLASSIFICATION

Official Delegates are those appointed by their governments through diplomatic channels. They will have the privilege of participating in certain official functions in addition to enjoying all the privileges of Members.

Members of Council of the World's Poultry Science Association will enjoy the same privileges as Official Delegates.

Members are persons other than Official Delegates who propose to attend the Congress. They will receive the printed reports of the proceedings and other Congress publications and will be entitled to participate in a programme of entertainments which will be intimated later.

Wives and relatives accompanying Official Delegates and Members will be entitled to the same privileges as Members but will not receive the printed reports.

Associate Members are those who are unable to attend the Congress but who wish to be associated with it and to receive the printed reports.

MEMBERSHIP FEES

	£	s.	d.
Fees include membership of the Congress Social Club, admission to the Congress Exhibition but not, in general, tours and excursions.			
Official Delegates and Members (Fully paid Members of the World's Poultry Science Association will be entitled to a reduction of 20% of this fee)	4	0	0
Wives and relatives of Official Delegates and Members	2	0	0
Associate Members	2	0	0

Cheques should be made payable to the Department of Agriculture for Scotland and crossed. Delegates and members from abroad should make payment by Banker's draft or International money order.

Applications for Membership of Congress should be submitted not later than 15th April, 1954.

HORMONAL CONTROL OF ECONOMIC TRAITS

C. S. SHAFFNER
Poultry Department, University of Maryland, College Park, Md., U.S.A.

The endocrine system of the body produces many different hormones which in turn exert a marked influence on body processes. Within recent years commercial preparations of these hormones, or materials having hormone-like activity, have become available. The work under this project has been designed to determine the feasibility of using some of the readily available hormones to alter certain physiological processes in the bird.

The female sex hormone has been used quite extensively in depressing male sex hormone production and thus increasing the market quality of broilers. The depressing of the male sex hormone production likewise renders the males much less active and decreases the damage from fighting among the birds. Since some of the broilers so treated are occasionally held for breeding stock, the effect of the treatment upon subsequent reproductive performance was investigated. It was found that implanting 8-week-old growing birds with diethylstilbestrol pellets materially reduced their subsequent reproductive ability. Hens so treated laid fewer eggs and they were smaller in size and had thinner shells than did the eggs of untreated birds. Males so treated produced noticeably less semen. It would thus appear that this treatment should not be employed upon birds intended to be maintained for egg production or as breeders.

Thin-shelled eggs are a serious problem to the commercial poultryman, particularly during the hot summer months, and represent an economic loss. As a result, studies were conducted to screen a number of hormones that might influence egg shell quality. Thyroxin, the hormone produced by the thyroid gland, tended to increase the thickness of the shells, while thiouracil, a compound which inhibits the natural production of thyroxin, decreased shell thickness. Progesterone, a hormone produced by the ovaries, likewise decreased shell thickness.

Previous reports have shown that the antibiotic penicillin affects the metabolism of calcium. This material was investigated and was found to have a marked effect on shell quality. When procaine penicillin was added to the ration of laying hens at the rate of 15 or 30 grams per ton, shell quality was definitely improved.

It has long been recognized that there are marked differences among the breeds and strains of domestic poultry with respect to their growth rate, rate of feathering, egg production and other traits of economic importance. These traits are under genetic control and can be influenced by selective breeding. The gene or genes involved must affect some physiological mechanism to bring about the desired results. Too little is known concerning the mechanism influenced by the gene or genes to make selection of maximum value. The activity of the thyroid gland has also been shown to be under genetic control. It would appear then, that some of the differences among breeds and strains can be explained on the basis of differences in thyroidal activity.

Experiments are being conducted to determine the role of the thyroid gland and other associated endocrine glands in bringing about differences in the economic qualities of different strains. Strains of birds have been developed which differ markedly in their thyroidal activities. These birds have been selected on the basis of the response of their thyroid glands when fed thiouracil (as shown in Fig. 1). Those with the greatest response appear to have the lowest thyroxin production rate.

Preliminary data indicate that the low-response line is superior in egg production and hatchability. During the course of the spring brooding season, a severe outbreak of Newcastle disease was experiencd. The mortality among the birds of the low-response line was only one-third as much as among the birds of the high-response line, indicating that thyroidal activity may also be related to disease resistance. (Maryland Agricultural Experiment Station 65th Annual Report).

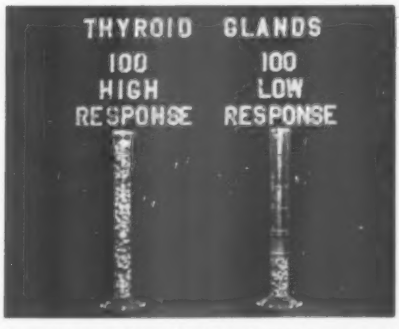


Fig. 1. Strain differences in thyroid gland response to feeding thiouracil.

EARLY FEATHERING AND RAPID GROWTH RELATED

MORLEY A. JULL
University of Maryland, College Park, Md., U.S.A.

The fact that rapid growth and early feathering are related is of considerable importance to broiler producers. Breeders and hatchery-flock owners serving the broiler industry should carry on a breeding program designed to combine these two characteristics in the same strain.

Except for a disease outbreak of epidemic proportions, rapid growth is the single most important factor affecting efficiency of feed conversion in chicken-meat production. Early feathering is important because it means fewer visible pinfeathers at marketing time. This factor is especially important since relatively more broilers than ever are being sold to consumers in the cut-up form.

During the past 15 years, much progress has been made in developing faster-growing strains of meatier-type chickens. A survey of the economics of broiler production in Maryland in 1934-36 showed that most of the broilers were sold at about 13 weeks of age, at which time they weighed less than 2¾ pounds per bird and consumed over 3¾ pounds of feed per pound of gain in weight. In 1952, many lots of broilers sold at 10 weeks of age averaged slightly over 3 pounds per bird and consumed about 3 pounds of feed per pound of gain in weight.

With respect to rate of feathering, practically all Leghorns are early feathering whereas prior to about ten years ago practically all general-purpose birds were late feathering. During recent years, however, many poultry breeders have introduced early feathering into their meat-producing strains of New Hampshires, White Plymouth Rocks, Delawares, etc. Early feathering is a sex-linked recessive character; thus the problem of developing a strain "pure" for early feathering is relatively simple.

Indicators of early feathering include well developed tail feathers at 10 days of age, well developed primary feathers and their coverts at hatching time, and at least 6 well developed secondaries at hatching time. The heritability of rate of feathering is relatively high, which means that the selection of prospective breeders on an individual basis is quite effective in developing an early feathering strain. At hatching time, poultry breeders would be well advised to select chicks with at least 6 well developed secondaries for future breeding purposes. Examine the wings from the underside.

One of the first reports indicating that rapid growth and early feathering are related was that of Dr. R. C. Warren and Prof. L. F. Payne of Kansas State College. They observed that at 12 weeks of age, early-feathering New Hampshire males and females were slightly heavier than late-feathering males and females, respectively. A little later, Dr. E. W. Glazener and I showed that, within two strains each of Barred Plymouth Rocks and New Hampshires, chicks with 6 or more well developed secondaries at hatching time were heavier at 10 weeks of age than chicks with less than 6 well developed secondaries at hatching time.

The most recent report showing that rapid growth and early feathering are related comes from Mr. H. F. Hurry and Dr. A. W. Nordskog of Iowa State College. Their observations were based on results secured with Barred Plymouth Rocks and New Hampshires. Rate of growth was determined on the basis of body weights at 8 weeks of age. Rate of feathering was determined on the basis of length of tail feathers at 13 days of age and completeness of body feathering at 8 weeks of age. The results they secured led them to observe that some of the genes determining degree of feathering at 8 weeks also influence body size attained at 8 weeks. They concluded, therefore, that any selection for early feathering would automatically result in more rapid growth.

POULTRY 4-H CLUBS ACTIVE IN FORMOSA

During the past few months, over 3,500 students in seven agricultural schools and over 1,500 young farmers in 88 villages on Taiwan, Formosa, have become members of the "Sze Chien Hui," similar to 4-H Clubs in America. Among the numerous projects carried on are those on judging chickens, raising ducks, chickens, and pigeons, designing and building chicken houses and constructing pigeon coops, and making kerosene and electric incubators of moderate egg capacity. The kind and quality of work done is evaluated by individual work records and thus the participants are encouraged to improve their practices. (Morley A. Jull, University of Maryland, U.S.A.)

TURKEY NUTRITION RESEARCH

F. H. KRATZER
Department of Poultry Husbandry, University of California, Davis, Calif., U.S.A.

Since California cotton production has expanded, we are giving more attention to the use of cottonseed meal in rations for turkeys. By the use of improved methods of processing, it has been possible to produce meals of higher nutritive value. Satisfactory growth and absence of white bar on the flight feathers were obtained when cottonseed meal was fed at over 20 per cent, supplying half of the supplementary protein fed to poults for the first four weeks. However, until we have better means of evaluating the quality of cottonseed meals, it is still not feasible to use the meal in starting rations where maintaining an adequate level of lysine is a problem. In growing rations, cottonseed meal can be used advantageously since the lysine requirement is much reduced. Work is continuing on feeding cottonseed meal at high levels to turkeys throughout the entire growing period.

FLAVORS IN TURKEY MEAT

Fishy flavor in turkeys is a problem which appears from time to time. Work conducted largely at the Western Regional Research Laboratory indicates that fishiness may result from the presence of certain unsaturated fatty acids in the ration, regardless of whether they originated in fish products. The fat which is normally synthesized by the turkey resembles beef fat in chemical character—and is relatively stable. It thus appears that the amount and character of fat in the finishing ration can markedly influence the acceptability of the carcass. If one assumes that the maximum amount of fat from fish sources which may be tolerated before a fishy flavor is noted is 0.4 per cent of the ration, and if fish meal contains 8 per cent of fat, one could feed 100 pounds of fish meal per ton of feed before the danger point would be reached. This means that we must rely heavily upon meat scrap or vegetable sources for protein as well as reduce the fish oil in turkey finishing rations. Further information is needed on the rate of turnover of fat in turkeys, although work at the U.S.D.A. station at Beltsville indicates that only the ration fed four weeks previous to market time influenced the flavor of the carcass.

Another flavor problem was presented to us last year when milo was defoliated by a weed killer before harvesting.

This enabled the growers to harvest the grain with a combine about a month earlier than would have been possible otherwise. The harvested milo retained a strong odor of the weed killer and the question was raised whether this could be fed to poultry without causing an off flavor in the carcass. Feeding experiments with chickens indicated that one needed to feed relatively high levels of the weed killer to depress growth. However, the same high levels in the feed of fryers did not cause any detectable odor in the carcass. Although it is not known how much of the weed killer may be expected to be on the grain which is harvested after being sprayed, it seems almost certain that these levels will not be high enough to cause either depressed growth or objectionable flavor in the carcass.

NEW NUTRIENTS

In the last few years vitamin B_{12} has been found to be important in nutrition. It is difficult to show the need for it in poult rations in which choline is adequately supplied unless the poults are hatched from hens which have been depleted of vitamin B_{12} for a long time. Vitamin B_{12} can reduce the amount of choline required for growth, but is not effective in reducing the choline required to prevent perosis. The antibiotics, the response of which was confused with that of vitamin B_{12} in early experimental work, have a definite place in turkey rations for the starting and early growth periods.

It still seems that there are other growth factors found in certain natural materials which are distinctly different from any previously recognized. The identification of these factors is engaging many laboratories throughout the country and the developments promise to be of considerable interest. Obviously the practical importance of these factors in turkey rations will not be known for some time after they are identified.

FEATHERS FOR FERTILIZER

USDA laboratories find use of feathers as fertilizer. A new process can make 150 million pounds of feathers, our annual output, into valuable organic nitrogen fertilizer. "Feather meal" can be used for direct application to land or as filler to prevent caking of chemical fertilizer. Meal analyzes about 14-0.6-0.25. One plant in Delaware is already in production. (U.S.D.A. Production and Marketing Administration, College Park, Maryland.)

SOME PROBLEMS IN THE SUCCESSFUL MARKETING OF HOME-PRODUCED EGGS*

N. E. HOLMES
Ministry of Food, London, England

"In view of the announcement made by the Ministry of Food that the grading of eggs for quality at registered packing stations will continue under conditions of de-control and of the possibility of a continuing expansion in home egg production following the de-control of feeding stuffs, this will perhaps be an appropriate occasion to examine some of the technical problems with which the Industry is likely to be economically faced and to discuss the responsibilities of various sections of the Industry in relation to them."

Experience in many food producing countries has shown the importance of orderly marketing and distribution of the products and of the need for making the greatest possible use of those features of seasonal production which are of economic importance to the food-producing industries. Excellent examples of this exploitation of seasonal production are found in the dairy and fat lamb industries of New Zealand.

These two factors of orderly marketing and seasonal production are matters of importance in the home-produced egg industry and carry with them technical problems, some of which will be considered in this article.

This country now relies largely on home production for its supply of eggs. Before the war about 70 per cent of our total egg supplies came from home production, whereas in 1951 the proportion had risen to 85 per cent.

While it may be the ideal arrangement for consumers to buy their eggs direct from producers and to eat them within 2-3 days of laying, such a system would be quite impossible to meet the needs of large concentrations of people in cities such as London, Liverpool, Glasgow and other large cities in this country. It is imperative therefore to have an orderly system for collecting the eggs from the producers, for grading them accordingly to size and quality and for presenting them in an attractive form to consumers through retail shops. Moreover the market has to be supplied throughout the year with reasonable quantities of eggs—gluts and scarcities are not attractive features in the marketing of the staple foodstuffs.

The grading of eggs at packing stations is partly auto-

* A paper read at a meeting of the United Kingdom Branch of the World's Poultry Science Association, London, March 20, 1953.

matic and partly based on the judgments of trained operators. The automatic grading of eggs into the various weight grades has the double purpose of giving consumers the choice of buying uniform lots of eggs, whether they are small or large and secondly of providing packs of eggs which will withstand transport over long distances without undue wastage due to breakages. The machines available in this country for such grading are well designed and constructed and operate well when kept in proper condition. This very feature of fully automatic operation has its dangers, for it happens all too often that some parts of the machine, such as the stamping mechanism, become neglected, so that many eggs, instead of carrying a clear mark to identify them as home-produced eggs, are disfigured with inky smears and blotches. This has been a matter of continual concern in this country and means must be found for eliminating this fault in the future.

The candling of eggs for internal quality is a more difficult and perhaps an even more important task. The publication "The Testing of Eggs for Quality" explains clearly how this grading should be done.

There are four general types of fault which can be detected by candling:

1. Cracked shells.
2. Faults such as blood eggs, blood spots and discolored yolks which occur in eggs when laid.
3. Fungal or bacterial rots which develop in a few weeks at normal temperatures or in 3-4 months at cold storage temperatures.
4. Faults characteristic of staling of eggs which are judged mainly by the appearance of the yolk shadow. When the yolk is displaced from its central position this is usually an indication of staling.

Apart from rotting, the occurrence of cracked and broken eggs is the most serious form of wastage in home-produced shell eggs. The extent to which lack of strength of the shells, the variation in size within each weight grade and the properties of the packing materials at present in use contribute to wastage due to damaged shells are problems urgently in need of investigation.

Faults such as blood eggs and discolored yolks have recently been described by Coles, who has stated that blood eggs and blood spots are due to a genetic factor in the laying birds and the only satisfactory method of control is to trap nest the birds, candle all the eggs and cull out the birds which lay eggs with such faults.

Discolored yolks are usually caused by the ingestion by the birds of certain plants such as shepherds purse, marsh mallow, cottonseed meal, acorns and even large quantities of young spring herbage.

Eggs with these two types of faults should be rejected by packing stations as inedible.

The badly displaced yolk is usually a sign of staling and is often associated with a diminution of the amount of the thick white and the weakening of the yolk membrane which causes the yolk to flatten.

An interesting form of displaced yolk not associated with the usual form of staling has been reported in eggs produced on some types of poor sandy soils. It is found that the yolks in such eggs are seriously displaced from the central position within a few days of laying and, although such a condition has been reportd on various occasions, little is known of the environmental or nutritional factors which contribute to or cause the condition, and there are no data to show whether the fault is associated with other changes such as a flattening of the yolk and a diminution of the amount of thick white which are characteristic of stale eggs.

The problem of fungal or bacterial rotting occurs in its most serious form in stored eggs, so it will be convenient to discuss these faults when considering the cold storage of eggs.

It is only during the last four years that cold storage of home-produced eggs has been practiced on any considerable scale in this country, though there has been a large industry in cold stored eggs for many years in America, while countries like Australia depend on cold storage for the export of shell eggs to the United Kingdom.

It is interesting to record that when the egg industries of various countries have reached such a stage of development that cold storage begins to be practiced on any considerable scale, troubles due to rotting usually arise. Three examples of this can be quoted in support of this statement.

1. Between 1934 and 1939, when Australia was developing a new export industry in shell eggs to the United Kingdom, rotting in some export packs reached very serious proportions.
2. During 1942-45, when in California the pattern of egg marketing changed and large quantities of eggs were cold stored to meet the needs of the rapidly increasing industrial population, a similar form of trouble occurred. Previously California had a large

export trade in shell eggs to New York, which would accept only the best quality eggs, and to Chicago, which had a highly speculative market willing to accept dirty eggs which were often cold stored and cleaned by sandblasting just before going into distribution.

3. During 1949-52, when the Ministry of Food developed the policy of oiling and cold storing eggs from the spring flush of production for release on the ration in the autumn, the trouble occurred once again.

Much earlier than this research workers, such as Jenkins and Pennington in America, had shown that the washing of dirty eggs before storage could lead to very serious losses due to rotting during storage. It seems however that each country must learn its own problems the hard way and it will be appropriate to quote experience in this country on this particular problem. In 1939 Haines showed how extensive could be the rotting in washed eggs and demonstrated that the washing of eggs in cold infected water could be especially deleterious. In 1938 Moran published a brief note describing results obtained in the laboratory by washing eggs by various methods. The highest proportion of rotten eggs was found in eggs washed in a machine consisting of rotating brushes and rubber rollers mounted above a water bath, while the method of cleaning dirty eggs which produced the lowest number of rots was by the use of a damp cloth or by steel wool. In these tests very dirty eggs were used.

During the past four years the Ministry of Food has made a special study of the storage characteristics of shell eggs treated with mineral oil to suppress evaporation and held for 6-8 months at a temperature of about 32° F. and a relative humidity of 80-85%. During the last year the investigation has been extended to include study of several different methods for the cleaning of dirty eggs. The results of these investigations will be published soon in one of the scientific journals but the main conclusions may be quoted in this report.

The oiling and cold storage of home-produced eggs was commenced in 1949, and it has been the constant aim of the Ministry of Food to obtain clean unwashed eggs for this process. Packing stations have been encouraged to select the best eggs for storage but it has become quite evident that many of the eggs set aside for oiling and cold storage have been washed or cleaned in some manner before they reached the packing stations. The results of a survey conducted by the

National Agricultural Advisory Service in 1952 gives ample support to such a conclusion, for this survey showed that taking into consideration the different systems of management and variations in weather throughout the year, about one third of the total eggs are produced in a dirty condition.

The Scientific Advisers Division of the Ministry of Food, with help from Eggs Division and the Cold Storage Division, commenced investigations on eggs about five years ago and during the spring of 1949, 1950 and 1951 examined in detail about 250 cases (90,000 eggs) of experimental eggs taken from eleven different packing stations in various parts of the United Kingdom and stored in eleven cold stores. Two different classes of eggs were used in these experiments—clean unwashed eggs and the normal run of packing station eggs. Half of these eggs were oiled and the remaining half were not oiled before being placed into cold store.

The results of the examinations after 3-6 months cold storage and 2-3 weeks at normal temperature after cold storage are shown in Table 1.

TABLE 1

Results of examinations of eggs after cold storage and holding at normal temperatures after cold storage.

Class of Egg	Rots found by candling (per cent)	Defects found by opening (per cent)	Total defects (per cent)
Clean unwashed eggs	no data available		0.4
Normal run of eggs			
(a) Oiled	1.8	2.6	4.1
(b) Not oiled	2.5	2.0	4.5

Thus the incidence of rotting in the normal run of packing station eggs was on the average eleven times as great as that in clean unwashed eggs. In some individual cases the trouble was much greater and reached values of nearly 12%—i.e. nearly thirty times as great as in clean unwashed eggs.

The particular form of rotting found in eggs which have been washed has two characteristics.

1. The trouble is often difficult to detect by candling—nearly two thirds of the rots in oiled eggs were found by opening eggs passed by candling.
2. The rotting develops very rapidly after the eggs are removed from cold storage.

In the next stage of the investigations a fairly comprehensive study was made of the effects of different systems of washing on the development of rotting in eggs when stored

for 4-5 weeks at atmospheric temperatures. For these experiments eggs produced under two different systems of management (fold units and colony houses) were used and farms in Lincolnshire, Essex and Cornwall were selected to supply the eggs. Many of the eggs used in these tests were only lightly soiled but heavily soiled eggs were also included. Five different systems of cleaning were used:

1. Cleaning by water and damp cloths on the farms.
2. Soaking for ten minutes in hot water and then rubbing with cloths in the laboratory.
3. Cleaning with steel wool in the laboratory.
4. Washing for five minutes in water maintained thermostatically at a temperature of 115° F. in an all-metal machine.
5. Washing in a machine equipped with rotating brushes and rubber rollers mounted above a water bath. The water used in this machine is added at a temperature of about 115° F. but the temperature falls during the operation of the machine.

All the eggs were kept for 4-5 weeks at room temperature and were then candled and opened. The main results obtained during these tests are given in Table 2.

TABLE 2

Numbers of faulty eggs found in lots of eggs cleaned by different methods and stored at room temperature for 4-5 weeks.

Treatment	Total eggs in each test	Total faults found by candling and opening (per cent)
Clean eggs—unwashed	6612	1.6
Dirty eggs—unwashed	6612	2.8
Dirty eggs cleaned on farms	6612	8.0
Dirty eggs washed by hand at laboratory	1065	6.8
Dirty eggs cleaned with steel wool at laboratory	1065	3.8
Dirty eggs washed in all-metal machine (water at 110-115° F.)	1065	4.8
Dirty eggs washed in machine with brushes and rubber rollers (water temperature initially 115° F.)	1065	35.7

The outstanding feature of this table is the very high amount of rotting found in eggs washed by the machine equipped with brushes and rubber rollers. All other systems of washing gave much lower values for wastage but it should be noted that the all-metal machine which relies on cleaning of the immersed eggs by agitating them with compressed air

was found to be not very efficient as a cleaning machine. These results show that the conclusions reached in other countries that the machine cleaning of eggs is a dangerous practice apply with equal force in this country. It may appear strange that machine cleaning should be so much worse than cleaning by hand with water and rags. The explanation is found in the conclusions of Australian workers that resistant types of organisms build up in brushes and rollers made of wood and rubber and attempts to reduce the infection by cleaning the machines have not proved successful.

As the result of the investigations into the problem of dirty eggs in this country, four conclusions have been reached:

1. Nearly one third of the eggs produced are dirty when gathered.
2. Hand cleaning on farms results in about one egg in twelve rotting during 4-5 weeks at ordinary temperatures.
3. Machine cleaning can, in certain circumstances, result in the loss due to rotting of more than one-third of the eggs.
4. Losses of this kind can reach serious proportions in cold-stored eggs and serious trouble may arise in eggs going into normal distribution during warmer weather.

The problem must be vigorously pursued and it is clear that the most hopeful line for future investigations to follow will be in full scale commercial tests of the washing of eggs in machines which incorporate the principle of pasteurization. This method of treatment of eggs to avoid the dangers of washing follows the original work of Funk in America who, during the last ten years, has carried out many studies on the heat treatment of shell eggs. Australian workers have also made a study of the pasteurization of shell eggs and one finds two general types of treatment recommended.

1. American workers (Gorseline, Funk and others) appear to favor a long time—low temperature treatment (16 minutes in water at 130° F. or 16 minutes under an oil spray at 135° F.) They point out however that eggs so treated develop a fair proportion of stuck yolks when stored at fairly high atmospheric temperatures.
2. Australian workers (Vickery and his associates) appear to prefer a shorter time of immersion in water at a higher temperature. (About 2-3 minutes at 145 to 140° F.)

Both of these ideas have found expression in machines for application on a full commercial scale. In America the firm of Gordon Johnson of Kansas City has made a machine for the pasteurization of twenty cases of eggs per hour by passing them under a hot oil spray, while in Australia, the Vinall Egg Company of Adelaide is marketing a machine for washing, pasteurizing and breaking into egg pulp of about fifty cases of eggs per hour.

Experience here and in other countries suggests that there are two possible methods of approach to the problem in this country.

1. The development of egg washing and pasteurizing machine of a capacity and a design suitable for use in packing stations in this country.
2. The improvement of egg washing machines for use on farms.

Each of these methods of approach has its drawbacks. Cleaning at packing stations can be criticized on the grounds that the best results are obtained when eggs are cleaned within a day or so of becoming dirty, while the concentration of the processes of cleaning at packing stations would mean that the work of these stations would be considerably increased. On the other hand it is difficult to see how the general use of washing machines on thousands of farms can be brought properly under control. Since the published results report little success in the use of disinfectants, such machines would have to depend (at least for the immediate future) on careful control of the temperature if the principle of pasteurization is to be used. Such a process is not by any means ideal for general use on farms. Moreover there is sure to be a great temptation to wash all eggs clean and dirty alike and this would be a most retrograde step.

After careful consideration it has been decided to direct special attention to the provision and testing of washing and pasteurizing machines of full commercial size in packing stations. To this end discussions have taken place with various manufacturing firms and it is hoped that prototype machines will be produced and be under test later in the year.

In conclusion it might be well to envisage what the successful development of such machines might entail in the way of modified practices on farms and packing stations. It must be emphasized that the best egg is the clean unwashed egg and producers must safeguard their industry by producing as many clean eggs as possible and by keeping them clean until they are packed.

If as the result of present research and industrial activities satisfactory commercial washing machines for use in packing stations are produced it will be essential to develop a scheme whereby producers would be encouraged to segregate their clean unwashed eggs at the time of collection from the nests and pack them separately from the dirty eggs before sending them to packing stations. In this way the marketing organizations would know the characteristics of the eggs they are handling and would thus be able to treat and market the different class of eggs accordingly with a minimum of deterioration and wastage. Such a system is operated with great success by certain egg marketing organizations in California and Australia.

For the success of such a system it would be necessary to have some method for the detection of washed eggs. The use of electric conductivity tests and the examinaton of eggs under ultra-violet light are reported to have been successful in Australia and America and it is proposed to include a study of this problem in our own program of work.

"THERMOSTABILIZED" EGGS

"Thermostabilized" shell eggs (eggs bathed in hot oil for a short time to maintain their quality during storage) were found to be acceptable to more than 92 percent of the consumers who used them, in a study made in Birmingham, Alabama, by the United States Department of Agriculture.

Previous studies showed that thermostabilized eggs retain their quality much better in storage than eggs treated by the usual cold oil process. After seven and one-half months storage, 84 percent of the thermostabilized eggs were still Grade A or better, while only 37.8 percent of those treated with cold oil were still Grade A.

Experimentally, it had been found that thermostabilization impaired the whipping quality of the eggs somewhat. The homemakers, however, reported little difference whether the eggs were fried, scrambled, boiled, in custards and cakes, or otherwise.

SOME PROBLEMS IN THE SUCCESSFUL MARKETING OF HOME-PRODUCED TABLE POULTRY—THE TREATMENT OF THE PRODUCT*

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If it had not been such a mouthful my paper might well have been entitled "The Purchasing, Preparation, Plucking, Processing, Preserving, Packing and Presentation of Poultry Products." It is a big subject, and impossible to cover in detail in thirty minutes, but your Secretary has assured me that questions will come thick and fast after this talk, and I hope that we shall be able to discuss those points which are of real interest to you then.

It is, as I say, a big subject and one in which there is, at present, considerable interest. It is not surprising that there should be this interest. The sight of the rather thin, poorly plucked old hen, hanging by her still dirty feet from a shop rail, looking slightly green about the vent and black about the neck, un-protected from dust and flies, but bearing a label—as if proud of the fact—saying "English," is still far too common. The contrast between such poultry and the plump, young chickens—with every scrap of feather and hair removed —clean and unblemished protected by a transparent wrapper and properly displayed in a cool show-case, is far too great; such poultry is available, occasionally, in this country but one associates it far more (I regret to say) with American Magazine advertisements.

Many Poultry Producers—you amongst them, I feel sure —are hoping that our British "treatment of the product" will improve rapidly and believe that only with such improvement can there be a real increase in the demand for, and consumption of, poultry meat in this country.

But I must here say that the story does not begin with the Poultry Packer—it begins at the Farm; good treatment can only make the best of the article which the farmer produces, it cannot make a rejected breeding cockerel into a tender chicken, nor can it make thin birds fat. The pre-requisite of good table poultry marketing is good table poultry. Everybody in the industry, and particularly the packer, is hoping that we shall see a great increase in the numbers of intensively produced young chicken of really good quality during the next few years. Personally I believe that we shall, for a number

* A paper read at a meeting of the United Kingdom Branch of the World's Poultry Science Association, London, March 20, 1953.

of reasons, none of which, however, come within the scope of this paper.

The methods by which poultry reach the consumer from the farm are many, some simple, some complex. The simplest is the sale of birds direct from the farm to the country housewife. This method, however admirable, accounts for a very small percentage of total poultry sales. Direct sales from farm to retailer are more common with either the farmer, or shop staff killing and plucking the birds, normally by hand. But by far the greatest proportion of British table poultry is purchased alive from the farm, either by a dealer or by a packing station.

There is no clear dividing line between dealers and packers but, broadly speaking, the term "dealer" covers the small one or two men business, handling limited quantities of poultry, with a minimum of equipment and without any mechanical refrigeration. Such dealers normally send their birds ungraded in returnable crates, to the wholesale markets. In recent years, however, new and somewhat bigger businesses have come into being, handling larger quantities of poultry and not only collecting and plucking the birds but also properly cooling and grading them, prior to sale. Their products are normally sold under a Brand name and in non-returnable boxes, either to wholesalers or direct to the retailer. It is this type of business which is now known as a Poultry Packing Station and it is of the "treatment of the product" by such units about which I propose to speak.

Packing Stations, then, almost invariably collect birds alive direct from the producer's farm; this is normally more satisfactory than for the farmer to deliver birds and few farmers have the equipment—a flat leaf lory and crates—available for transporting live birds. The packer can arrange collections so as to spread work fairly evenly through the day and through the week and can arrange for his lorries to call at several farms on round trips, saving time and petrol.

The normal method of collection is for the buyer to weigh the birds alive at the farm and to transport them in crates holding between ten and fifteen birds, stacked on an open lorry. Vans or closed vehicles of any type are unsuitable, giving a high incidence of suffocation, particularly in warm weather.

The one exception to this general rule may be in the case of turkeys which may be satisfactorily collected in cattle floats.

At this stage the one essential is that the poultry shall have been starved, on the farm for at least twelve hours; failure to withhold food for this period causes trouble all along the line, and the buyer must deduct the estimated weight of food in crop, since he cannot reasonably be expected to pay two or three shillings a pound for poultry mash, however good.

If poultry has been properly starved at the farm, then the shorter the time between collection and killing, the better. Certainly live poultry should not be held overnight. There is continuous loss of weight in the form of moisture in the breath of the birds, body tissues are used up to maintain body temperature and activity, and waste matter is excreted in the form of droppings. From tests which we have made it appears that the normal loss of weight in hens which have been properly starved at the farm is approximately one per cent every six hours. Young chickens of between three and four pounds live weight appear to lose up to two per cent every six hours; ducks, especially fat young duckling, lose weight even more rapidly.

I must here state that these figures are based on practical observation and have not, as far as I am aware, been the subject of laboratory tests anywhere. All sorts of conditions, room temperature, humidity, type of food at the last feed, age and type of birds, have an effect on the shrinkage rate. In general, however, birds should obviously be killed, and normally are killed, within eight hours of collection if undue loss of weight is to be avoided.

A word here about what the Americans call "feeding rooms." These are rooms at the Packing Station where birds are placed in cages for a final fattening for a few days prior to killing. While it is certainly true that birds can be fed, and will gain weight, in cages if sufficient food is placed before them for a suffcient number of days, it has always seemed to me to be an unsound and uneconomic practice under normal conditions in this country. The proper place to fatten chickens is, surely, on the farm. Even in theory it seems unlikely that they will fatten more economically immediately after the disturbance caused by handling, weighing and transporting. Several years ago the Americans produced large quantities of statistics which set out to show that there was, in practice, a gain in live weight but no two sets of these statistics seemed to agree and I do not propose to quote them. Several Packing Stations in Britain have tried out this final fattening proce-

dure, but all have discounted it. I was not surprised to hear, very recently that the number of American Packers now using their Feeding Rooms is rapidly diminishing.

On arrival at the Packers' premises, birds are normally removed from the crates immediately, counted and weighed, and placed in castor mounted cages. Birds may, of course, be killed direct from collecting crates but this additional check at the Factory provides a useful administrative control.

There are three normally accepted methods of killing poultry. At present dislocation of the neck is the method most widely used. Death is instantaneous, but the disadvantage of this method is that it is impossible to bleed poultry effectively after the neck has been broken. Killing by bleeding may be carried out in either of two ways:—the throat may be cut externally, as in Kosher killing, or the bird may be stuck internally through the mouth; in either case a clean cut of the jugular vein should result and bleeding should be complete within forty-five seconds.

Finally, birds may be killed by piercing the brain; if correctly done the nerve center at the back of the brain—the medulla oblongata—is destroyed, with the result that the nerves controlling the feather retaining muscles slacken, making plucking easier. After braining, the jugular is cut and bleeding proceeds normally.

Bleeding has its advantages and one big disadvantage. The disadvantage is fairly obvious—the loss of weight that ensues. In an ideal world this loss, which amounts to between three and four percent of body weight would not matter for in an un-bled bird the blood drains into the neck and is removed by the retailer, or the housewife. Bleeding at the Packing Station does not, therefore, reduce the amount of edible poultry and the price paid per pound for birds which have been bled should, automatically, be three or four per cent higher, since the final wastage figure will be that much lower. In practice, while this may be the case if appearance is improved by bleeding, such a premium increase is by no means automatic and the majority of dealers, and some Packing Stations, do not bleed their birds for this reason. Bleeding does, however, improve the appearance of poultry when the neck is plucked clean, and bleeding is essential if poultry is to be frozen. After freezing and storage blood no longer remains coagulated in the head and neck but flows back into the body, staining and discoloring the breast.

Plucking should commence as soon after death as pos-

sible, preferably while the bird is still kicking with nervous reaction. As poultry grows cold the feather follicles tighten round the feathers and make plucking, by any method, progressively more difficult.

There are, at present, five methods of plucking in use in this country:

First, and possibly still the best, is plucking by hand, which is extremely good when well done, and very bad indeed if inefficiently carried out. It is, unfortunately, a comparatively slow process and is completely uneconomic for the preparation of large numbers of table poultry.

Dry plucking, by machine, is still widely practiced, and in the hands of good operators, these machines can produce satisfactory results. The machines suck the feathers between revolving metal discs which come together as they revolve to grip the feathers and pull them from the bird. Considerable hand finishing is required after machining and, while the method is suitable for small units, labor costs are considerably higher than with the various forms of wet plucking which are now becoming popular.

This wet plucking, as the term implies, involves dipping birds into hot water prior to plucking. This has the effect of loosening the muscles in the feather follicles. Hard scalding, i.e., dipping birds into water at a temperature of 180 to 190° F. is very effective but destroys the outer skin tissues so that birds turn brown and greasy and are exposed to bacterial attack which results in rapid spoilage. This method is, therefore, only suitable for poultry which is to be cooked at once or poultry which is being prepared for immediate canning.

Semi-scalding, which is now the method most widely used at the larger plants involves dipping birds into water at much lower temperatures, about 130°F. for half a minute, or 126°F. for a full minute. This has the effect of loosening the muscles holding the feathers but does not damage the skin in any way.

After the warm water dip birds are plucked by rubber fingered machines. These machines consist of revolving drums to which the rubber plucking fingers are attached, these fingers knocking against the feathers and drawing them out from the skin, without damaging the skin itself. Such plucking is very rapid. A competent operator can remove 98% of the feathers from a bird in less than one minute and can maintain an average rate of fifty birds an hour throughout an eight hour day. Hand plucking, or finishing is reduced to a

minimum, the amount required depending on the type of bird. Hens may be finished by hand at the same speed, namely, at the rate of fifty an hour; chickens are very much more difficult, especially if stubby, but in any case, should not require more than a further two minutes' work. Turkeys may be plucked by this method but ducks and geese are not affected by the water dip and plucking these birds on rubber fingered machines is difficult, though not impossible.

The American system of plucking on an overhead conveyor line is based on this semi-scald method. There is one such plant at present operating in Great Britain and at least two other Packing Stations are converting their equipment for use with an overhead conveyor. The capital expenditure involved is considerable and has not proved worth while for the majority of the comparatively small Packing Stations which exist in this country. There is no doubt, however, that if Packing Stations continue to grow and prosper this American System will be adopted here. Wax Plucking. Finally we come to wax plucking. This involves dipping the bird in molten wax, hardening the wax in water or cold air, peeling off the wax, to which feathers adhere. It may be used for the whole plucking process, or it may be used only for finishing after wet plucking. It is somewhat expensive in equipment and although most of the wax may be reclaimed there is some wastage of this material, which is not cheap. But there is no doubt that the method is effective, and produces excellent results.

After plucking comes what is, to my mind, the most important stage in the processing of poultry, cooling. Ideally, birds should be cooled immediately to 33°F. At this temperature, multiplication of bacteria within the bird is very slow and birds thus remain fresh for a considerable period. This cooling may be effected in a variety of ways. First and still the most common method, is to hang the birds on racks in still air at room temperature. This is reasonably effective during the winter months when room temperature may well be at or near freezing point. It is completely unsatisfactory during the summer when birds so treated may never reach temperatures lower than 70°F. At such temperatures spoilage takes place very rapidly indeed. The time taken to produce greening varies with the type of bird but small chickens will show greenness at the vent within eight hours of killing if "cooled" in this way during the summer.

Cooling may be accelerated without the use of mechani-

cal refrigeration by hanging the wet birds in moving air; large fans should be part of the equipment of all poultry processors who are working without refrigeration.

Another method of cooling, and one which is most effective, is to place birds in iced water for several hours; if this iced water is agitated then cooling takes place very rapidly indeed and the internal temperature of a 5 lb. hen may be reduced from blood heat to 35°F., within four hours. Water cooling has, however, the disadvantage that birds must be dried before packing and the method is not in common use in this country since it requires a good deal of labor, equipment and space. It has the advantage of slightly increasing the weight of the birds (by about 2%) whereas air cooling—with or without refrigeration—causes a loss of weight by dehydration of between 1 and 3%. Personally I believe that a close study of the water cooling method, which is widely used in America, might prove very well worth while.

Finally, we come to cooling by refrigeration. By this method birds are normally left on racks which are wheeled into the chilling room; this room should be maintained at 33 to 35°F. by refrigerated pipes or plates which have the refrigerant running through them. Normally, this refrigerant is ammonia, but other liquids are in fairly common use, especially in the smaller units. As with the air cooling method, fans to move the air inside the chilled room are extremely useful and it has been calculated that refrigerated air moving at a speed of 8′ per second is twice as effective as still air at the same temperature.

One method of cooling by refrigeration is by the use of refrigerated racks, whereby the individual birds are placed with the vent against specially sloped pipes, containing the refrigerant liquid. This has the effect of cooling the abdomen —the most difficult portion to cool—rapidly and effectively. The method is in use in a few packing stations in Britain and may well become popular if the capital equipment does not prove too expensive.

A word now about "Sweating" as it is called.

I have said that—ideally—poultry should be reduced as rapidly as possible to a temperature of 33°F. This is only ideal, however, from a keeping point of view or where poultry is to be displayed in a refrigerated show case; 33°F. is not an ideal temperature for birds to arrive at a retail shop because, as soon as they come into contact with warm air they will "sweat." This "sweating" is nothing more nor less than con-

densation of moisture contained in warm air on the cold surface of the bird, it is not—as is so widely believed—moisture exuding from the bird itself. It is, however, unsightly and much disliked by the average retailer. Birds that are destined for retail sale must, therefore, be allowed to reach within 10° or 15° of atmospheric temperature, before they reach the shop. This is not, by any means the same thing as the normal procedure of never reducing the internal temperature of the bird below atmospheric temperature. Chilling must come first, to inhibit bacterial growth, if poultry is to keep for any length of time.

After cooling most Packing Stations are now grading their poultry for weight and quality.

I do not propose to discuss methods of grading now; the Ministry of Agriculture's recommended grades are very satisfactory for most purposes. I will only say that close grading is eminently desirable if our home produced poultry is to compete in this respect with imported birds. But such close grading obviously depends on there being large numbers of birds to grade available every day. It is only the large Packing Stations which can grade birds satisfactorily; the larger the Packing Station the better the grading can and should be.

Having graded birds, they must then be packed according to grade. I believe that the ideal size of pack for sale, either through wholesalers or direct to retailers, contains six birds, and is non-returnable. Such a pack is, obviously, more costly in material than the larger crates containing twelve or two dozen but experimental work, with the use of fibre board, instead of wood, is pointing the way to a reduction of packing costs.

The preservation of poultry by freezing is a subject big enough for a paper of its own. Briefly, poultry may be frozen commercially in one of three ways.

First—and most common—is the freezing of boxed poultry in cold store. This can be fairly effective provided that the store temperature is and can be maintained at or below 0°F., and provided also, that the crates are not too large and that they are stacked in open formation to allow circulation of cold air. Poultry will not freeze satisfactorily in large crates or in normal commercial store temperatures of 15 to 20°F. It is far more effective to freeze boxed poultry in a blast freezer operating at –20°F. and with considerable circulation of air. Individual birds, especially if small, may be frozen in plate type

freezers, but this cannot be considered a satisfactory method for birds of over four pounds.

Much poultry is spoiled after freezing because of poor storage conditions. Ideally, poultry in cold store should be wrapped or boxed, in air-tight containers, otherwise there will be dehydration and pock-marking of the skin which detracts greatly from the sales' value of the bird. Storage temperature depends to some extent on the length of time for which birds are to be stored. 10 to 15°F. is adequate for periods up to three months. Lower temperatures must be used to prevent rancidity if birds are to be stored for a longer time. At –10°F. poultry will store without apparently deteriorating for an almost indefinite period.

I have not yet touched upon the important subject of eviscerating or drawing poultry; at first glance it does appear that this is an operation which should be done at the Packing Station, in order to avoid the cost of transporting waste matter, and in order to provide the retailer with an easy to handle article which is ready to sell without further preparation. Despite these obvious advantages it will be some time before much poultry is sold to the retailer ready eviscerated, for eviscerated poultry goes bad very much more quickly than undrawn birds. It is essential that there be an adequate chain of distribution with refrigerated transport and refrigerated show cases in retail shops before this very desirable change comes about. With the present restrictions on capital expenditure such a change can only come gradually but I am certain that within ten or fifteen years much poultry will be sold, drawn.

Some Packing Stations, particularly those with quick-freezing plant and cold storage are now experimenting with the production of cut-up poultry; that is to say, poultry divided into joints, legs, breasts, etc., ready for sale in small quantities. There is already a small market for such jointed poultry and one which events here, following the American pattern, will develop gradually. Again, there is the difficulty of distributing this cut-up poultry in good condition through retail shops as they are at present equipped.

I am only too conscious of the fact that much of interest has been omitted from this very brief survey but the time which I have been allotted is now up and I can only hope that the omissions will bring questions from you now.

POULTRY NUTRITION RESEARCH AT UNIVERSITY OF MARYLAND

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UNIDENTIFIED GROWTH FACTORS

Studies have been continued which confirm the existence of two different unidentified factors required for rapid growth of chicks. Both practical-type and purified-type rations have been used. One of these factors can be supplied by either fish meal, liver products, or dried brewers' yeast while the other is present in dried whey products and fermentation solubles. Dried brewers' yeast appears to contain both factors. A potent concentrate of the first of these factors has been prepared from liver by chemical and physical fractionation. This concentrate was effective in promoting the growth of chicks when fed at a level of 22 milligrams per pound of diet. Recent studies suggest that three, instead of two unidentified growth factors, are required under certain conditions.

It has also been found that the requirement of the chick for the factor present in liver is increased when the hormone, thyroxine (supplied by iodinated casein), is fed. The bacterial flora which becomes established in the chick during the first few weeks of life also appears to exert an influence on the requirement for these factors.

PROTEIN LEVEL OF BROILER RATIONS CAN BE LOWERED AFTER SEVEN WEEKS OF AGE

Experiments with large numbers of broilers show that the total protein level in all-mash broiler rations may be reduced from 21 per cent to 18 per cent at 7-8 weeks without impairing the growth rate. Such a reduction of the protein level in rations for broilers 7 weeks of age and older should improve feed costs.

The use of different all-mash rations to reduce the protein level is believed to be more desirable than the feeding of supplemental scratch grains or low-protein pellets. Less feather pulling and better market quality of birds should result on the all-mash system. The protein level may be reduced by replacing a portion of the soybean oil meal in the all-mash starting ration with an equal amount of corn.

METHIONINE SUPPLEMENTATION

Several experiments have also been carried out to determine the value of supplemental DL-methionine in broiler ra-

tions. In one trial, the addition of 1 pound of methionine was found to improve the average weight at 10 weeks by almost 0.2 pound. At the same time, the feed required to produce each pound of broiler was reduced by 0.12 pound. In another test no benefit was obtained.

FEATHERING AND FEED EFFICIENCY OF BROILERS

In a trial conducted at the Salisbury Poultry Experimental Farm, the addition of nicotinic acid and calcium pantothenate to a practical-type broiler ration improved the feathering conditon, growth rate, and feed efficiency of broilers housed in pens with radiant-heated floors. Under these conditions, the addition of 20 grams of niacin per ton of feed resulted in better feathering, heavier birds, and slightly better feed conversion than was obtained when 0 or 10 grams of niacin were added per ton. Including 5 per cent wheat standard middlings, 5 per cent of pulverized oats, or a combination of both also slightly improved the feather scores at 10 weeks. Nevertheless, the addition of these materials does not appear to be an economic way to counteract poor feathering, since they reduced feed efficiency.

The most striking observation in this trial was the marked improvement in the feathering condition between the broilers housed in the floor pens heated with overhead hot water heat and containing litter as compared with those broilers reared in pens heated with radiant heat and containing no litter. All groups housed in the pens with litter and overhead heat showed excellent feathering and derived no additional benefit on feathering from the supplements.

Fig. 1. The 4-week-old New Hampshire chicks on the left received a purified diet deficient in a growth factor still to be identified. Those on the right were fed the same diet plus a liver supplement apparently containing this important unknown factor.

EFFECT OF ENVIRONMENT ON ANTIBIOTIC RESPONSE

Since bacterial contamination of the environment was considered likely to influence the action of antibiotics in stimulating growth in chicks, a study was carried out to compare results in a very clean and a normal environment. Chicks reared in a new room containing new equipment (very clean environment) grew more rapidly than chicks reared under the usual environment (normal) for battery brooder-reared chicks. This was true regardless of the type of rations used. The addition of penicillin did not appreciably improve the growth of chicks reared in the very clean environment, while a growth response was observed in the normal environment.

EFFECT OF BACTERIAL FLORA ON CHICK GROWTH AND ANTIBIOTIC RESPONSE

The bacteria in the intestinal tract appear to have a decided influence on the growth of chicks or other animals. Previous work in this department has shown that antibiotics increase the number of coliform bacteria and reduce the numbers of lactobacilli in the chick cecum. Accordingly, chicks were fed massive cultures of these coliform bacteria (*Aerobacter aerogenes* and *Escherichia coli*) to determine their influence on growth. Slight but consistent and statistically significant increases in growth were noted when these cultures were fed in the presence of procaine penicillin G. The addition of these cultures to diets increased the response obtained from the antibiotic approximately 80%. These results suggest that chick growth and antibiotic action is influenced

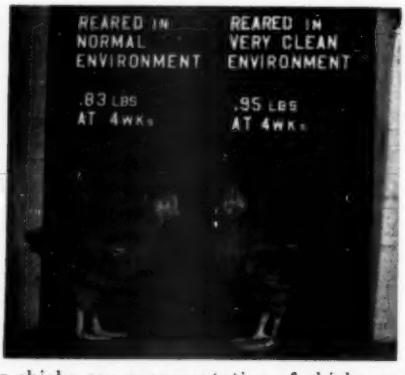

Fig. 2. These chicks are representative of chicks reared in a normal environment (left) versus a very clean environment (right). The very clean environment consisted of new equipment in a new room never before used for poultry. Both chicks were from one source and fed identical rations.

by the types and numbers of microorganisms present in the intestinal tract of the chick.

A compilation of results of several experiments with chicks reared in battery brooders under normal conditions and fed various practical-type rations revealed that the average improvement in gain during the first 4, 6, and 8 weeks of life was 17.2 per cent, 12 per cent, and 6.4 per cent, respectively, when penicillin was added to the ration. A level of from 2 to 2½ grams per ton is considered satisfactory for use in chick-starting rations or broiler mashes since in these trials, levels from 1 to 2½ grams per ton stimulated growth to approximately the same extent as higher levels.

SURFACTANTS

In one battery trial, two surface acting agents (surfactants) were used at levels of 50 and 100 milligrams per pound. No growth responses were noted as a result of the addition of these surfactants to the feed until the birds were 5 weeks of age. However, by the end of the 7th and 8th weeks, the combination of the two surfactants used had stimulated growth of the chicks to the same degree as was obtained with penicillin. Combinations of the surfactants and penicillin were no more effective than either supplement alone. (Maryland Agricultural Experiment Station 65th Annual Report)

POULTRY DISEASES TRANSMISSIBLE TO MAN

In a discussion presented at the Poultry Sanitation and Inspection Short Course, held at Omaha, Nebr., March 17-21, 1952, Dr. H. W. McFadden, Jr., lists the following infectious diseases now known to affect both man and fowl:

Viral diseases

1. Ornithosis—psittacosis
2. Eastern and western equine encephalomyelitis
3. St. Louis and Japanese B encephalitis
4. Newcastle disease

Fungal diseases

5. Aspergillosis
6. Favus
7. Thrush
8. Systemic fungal infections

Bacterial diseases

9. Listeriosis
10. Erysipeloid
11. Brucellosis
12. Tularemia
13. Pseudotuberculosis
14. Avian tuberculosis
15. Purulent processes
16. Salmonellosis
17. Other bacterial infections: Proteus sp.; Paracolons; Pseudomonas sp.; Hemolytic; Streptococci; Others.

Although direct transmission to man has not been shown in all instances, there is increasing conviction that birds, in general, are reservoirs of many diseases affecting man and other animals. (Veterinary Medicine)

PIGEONS AS A SOURCE OF THE TURKEY SINUSITIS AGENT

R. W. WINTERFIELD,* D.V.M.
St. Louis, Missouri, U.S.A.

Pigeons are frequently observed on poultry ranges. Their presence and the fact that they often eat and drink from poultry feeders and waterers has focused attention on their role in the transmission of some infectious diseases.

The following case report concerns the isolation of the turkey sinusitis and chronic respiratory disease agent from pigeons.

HISTORY

A squab producer with 300 pairs of breeders was experiencing a respiratory disease problem in his pigeon loft. Troubles commenced a short time after 40 breeder replacements were purchased from a grower whose birds had been confined in a pen adjacent to chickens. Respiratory symptoms developed in these purchased birds and spread slowly through the other pens. Mortalities were appreciably higher in the squabs. A chronic, debilitating course was experienced in this outbreak.

LABORATORY FINDINGS

Clinical examination of three typically affected birds revealed a nasal discharge and respiratory rales. Marked conjunctivitis was present in one specimen. On autopsy thickened, caseated air sacs were present in two and all three had a severe tracheitis. Routine bacteriological examinations were negative. Hemagglutination-inhibition tests for Newcastle disease were negative. Affected respiratory tissues and tracheal exudate were macerated, suspended in tryptose broth and injected intrasinusoidally into four, ten-week-old turkey poults. All birds developed a typical sinusitis in six to ten days.

Sinus fluid aspirated from these poults was found to be bacteriologically sterile, and then diluted 1:4 with tryptose broth. Seven-day-old embryonating chicken eggs were inoculated via yolk sac with this material. The agent was carried through four serial passages in eggs and showed a marked lethal effect for the embryos as early as the first passage. Embryonic deaths usually occurred by the end of the seventh day, and subcutaneous hemorrhages were observed in some mor-

* Ralston Purina Company, Animal Pathology Division, St. Louis, Mo.

talities. Most strains of turkey sinusitis and chronic respiratory disease agent isolated in our laboratory have not shown this early embryonic mortality pattern.

Amnioallantoic fluid was harvested and used as inoculum in experimentally producing typical infectious sinusitis in turkeys and chronic respiratory disease in chickens. Negative results were observed in weanling mice inoculations.

Four healthy squabs were inoculated intranasally. Ten to 20 days postinoculation all four pigeons exhibited respiratory rales and three of them had a severe coryza and conjunctivitis. They were sacrificed for autopsy and severe tracheitis was noted in three.

COMMENTS

Since infectious sinusitis and chronic respiratory disease are very widespread and of great economic importance to the poultryman, one should not overlook any of the ways in which the causative agent can be spread. The pigeon may be considered as one possible means of transmission. (Veterinary Medicine)

A POULTRY BOOK IN BRAILLE

Soldiers blinded in wars or from other causes may "look forward" to going into the poultry raising business as a means of making a living if the plans of Mr. G. W. R. Shepherd materialize. Thirty-five year old Mr. Shepherd was totally blinded in action at Calais in 1940. From that time through 1947, he was at St. Dunstans, an institution for blinded British men and women.

Mr. Shepherd has a small holding of seven acres on which he produces eggs and table poultry and raises pigs and Christmas trees. Mrs. Shepherd is his "seeing eye", although it is remarkable the numerous things Mr. Shepherd can do, including typing. He is in this country for several months getting practical experience and studying up-to-date poultry production methods. On his return to England, he plans to prepare for publication a poultry book in braille. Such a book should be of great value to the other 600 St. Dunstaners at present engaged in agriculture as well as others who may suffer the same misfortune in the future. Mr. and Mrs. Shepherd are very fine people and deserve every encouragement. (Morley A. Jull, University of Maryland, U.S.A.)

THE NATIVE EGYPTIAN HATCHERY IN A POULTRY IMPROVEMENT PROGRAM[1]

W. M. REID[2] and AHMED DARDIRI[2]

Baby chicks have been produced in Egypt for thousands of years in unique hatcheries that are so efficient and so suited to the country that they are being considered in Egypt's new National Poultry Improvement Program.

Every year, 99 percent of the country's baby chicks are hatched in the 500 native hatcheries, by methods that have been passed on from generation to generation. Operators live in the hatcheries during the incubation period and with no modern equipment accomplish a percentage of hatch that compares favorably with that of mechanical incubators.

OPERATIONAL METHODS

The hatchery is a mud-brick building through which runs a central corridor. On either side of the corridor are six or eight domed rooms, each of them a hatchery unit large enough for about 6,000 eggs. In the dome of each room is a vent about the size of a stovepipe, which is closed or opened by inserting or removing a wad of cloth. The rooms are of double-deck construction. The waist-high second floor has a central manhole in which the operator can work while transferring eggs from one deck to another.

On two sides of the upper deck smoldering straw fires on trays furnish heat for the incubation. These fires are lighted with burning coals brought in an earthen vessel from a fire that is kept burning in a special area of the plant. The straw fires burn during the first 11 of the 21 days of incubation. After the eleventh day, the only heat required to complete the incubation is furnished by the developing embryos and preserved within the double mud-brick outer walls and ceilings.

The operator of the hatchery keeps the temperature of the rooms uniform without the aid of a thermometer; he depends on his own sensitivity to changes in temperature. For that reason, he stays in the hatchery during the entire hatching season, usually sleeping in a room adjoining the incubator.

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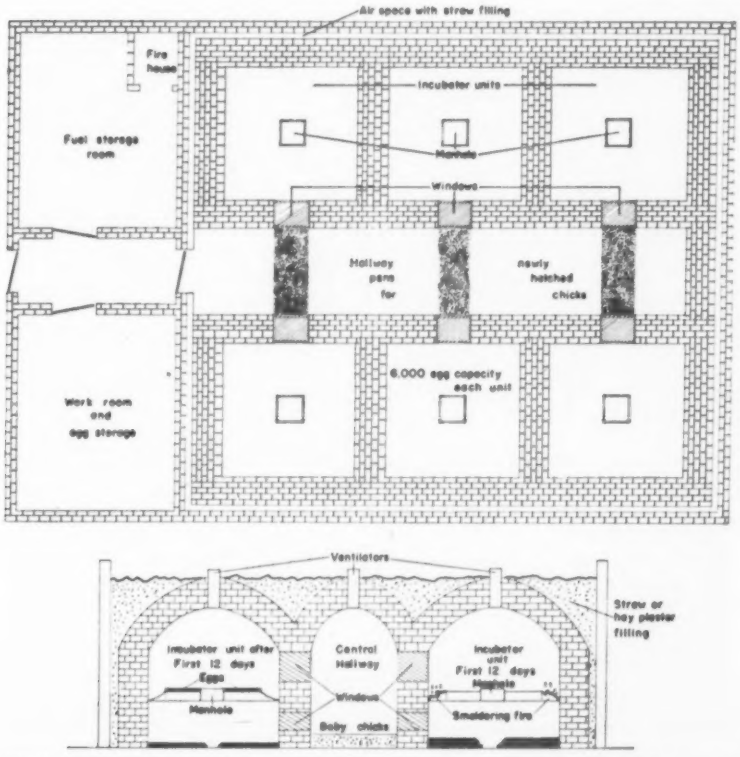
[1] Foreign Agriculture, May 1953, Vol. 27, No. 5: *99-103*. Illustrations courtesy Miss Alice Fray Nelson, Editor, Foreign Agriculture, Washington, D. C.

[2] Dr. Reid is Animal Health Consultant, Point Four, American Embassy, Cairo, Egypt.

Dr. Dardiri is a member of the Faculty of Veterinary Medicine, Cairo University, and Egyptian Poultry Consultant, Point Four.

If he senses a change in temperature, he tests the eggs by pressing one against his eyelid. If it is cool, he adds straw to the fires or provides more draft by removing the rags from the flues, which are located below the fire trays. If the egg is too warm, he opens the ceiling vent.

All operations in the hatchery are carried out according to a traditional schedule. The operator follows the schedule to the letter and diligently attends the hatchery, for his income depends on the percentage of the hatch. Before he puts the eggs into the incubator, he sorts them and removes the cracked ones. Hatchery operators are highly skilled in detecting cracked eggs; they do so by gently clicking three or four eggs against each other in one hand. The cracked ones emit a sharper note than do sound ones. The exact hour at which the fire is set is considered highly important as is the regularity with which the eggs are turned and their positions changed in relation to the fire.



Native Egyptian hatchery: floor plan and cross section through two incubator units.

The operator candles the eggs on the seventh day using an oil lamp or by holding the eggs up to a beam of sunshine, which comes through the vent. On the thirteenth day, half of the eggs are moved from the lower to the upper deck and all of the eggs are spread out in a single layer. On the twenty-first day, the chicks begin to hatch and are moved at 3-hour intervals to walled-off areas on the floor of the central corridor. Here they are kept until they become active and are ready for shipment to village farms, often in palm-branch crates borne by donkeys.

EGG SIZE AND THE NATIVE HATCHERY

Native hatcheries have sometimes been blamed for the small size of the eggs in Egypt; they weigh on the average about 30 grams, only half as much as those of standard breeds. In years past, Egypt has had difficulty exporting these small eggs. It may be true that the farmer, contractor, and operator eat the larger eggs and take only the small ones to the hatch-

Every hatchery operator has his own way of recording essential information on each brooder unit. This man marks a cross outside the unit that was started on Sunday.

eries, as is claimed, but eggs produced in nearby countries where these hatcheries are unknown have small eggs too.

A determined effort to select larger eggs for hatchery purposes was made by the Ministry of Agriculture some years ago. A mechanical device for selecting eggs of a 40-gram minimum was devised and an inspection program instituted. This program was abandoned when poultry losses became excessive due to diseases. It seemed advisable to remove restrictions from the native hatcheries in order that more eggs would be incubated and more baby chicks would be produced each year. Efforts to increase production are still being made. For example, there are regulations that prevent shipment of eggs for food out of certain Provinces during the hatching season, November to May; it is assumed that with an egg surplus in these areas more eggs will be set in the incubators.

ROLE OF THE NATIVE HATCHERY IN THE POULTRY INDUSTRY OF EGYPT

Egypt's poultry industry is based primarily on the flock owned by the small farmer. The small farm flock may consist of 6 to 20 three- to four-pound chickens of mongrel stock. The chickens are fed on scraps and scavenge for food in the village streets. There is no investment in equipment and very little expenditure for feed.

Chicks for these small farm flocks come from native hatcheries. Modern incubation equipment is being used on government poultry farms and by poultry establishments of the Amateur's Poultry Breeder's Association and educational institutions. But the equipment is largely imported, and the original capital expenditure and maintenance and operating costs are high. Such equipment cannot compete on an economic basis with the native hatchery in which a chick can be hatched for a few cents.

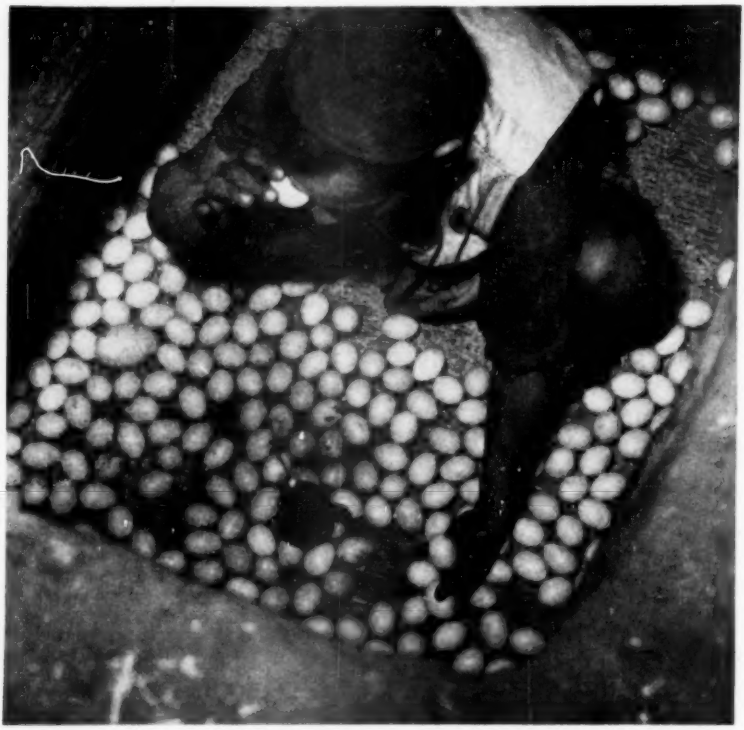
The native hatchery figures prominently in the government's plans to aid the small poultry farmer and through him to strengthen the country's poultry industry. Native hatcheries have been installed on government poultry farms for demonstration purposes and for study. Officials are discussing ways by which operators of the native hatcheries can be brought into the National Poultry Improvement Program that is being planned.

THE NATIVE HATCHERY IN A BREED IMPROVEMENT PROGRAM

Until cheap power is available, native hatcheries will continue to hatch more than 99 percent of the eggs incubated in

Egypt. Operators of these hatcheries not only furnish the bulk of the baby chicks for the Egyptian poultry industry, but they also constitute an important source of information on poultry raising for the farmer.

For that reason they could help persuade farmers to substitute high-producing standard breeds of chickens for native poultry by offering higher prices for eggs of the standard breeds. No general effort has been made to get the small farmer to raise these breeds. For many years the officials of Egyptian Government poultry farms and the wealthy amateurs have publicized the advantages of standard breeds. Problems of feeding and disease control in the villages have, however, prejudiced some poultrymen against the breeds. More recently limited demonstrations in the villages indicate that standard breeds can be raised under village conditions, but further tests are planned to determine whether it is practicable to do so. These tests will be large-scale field demonstration pro-

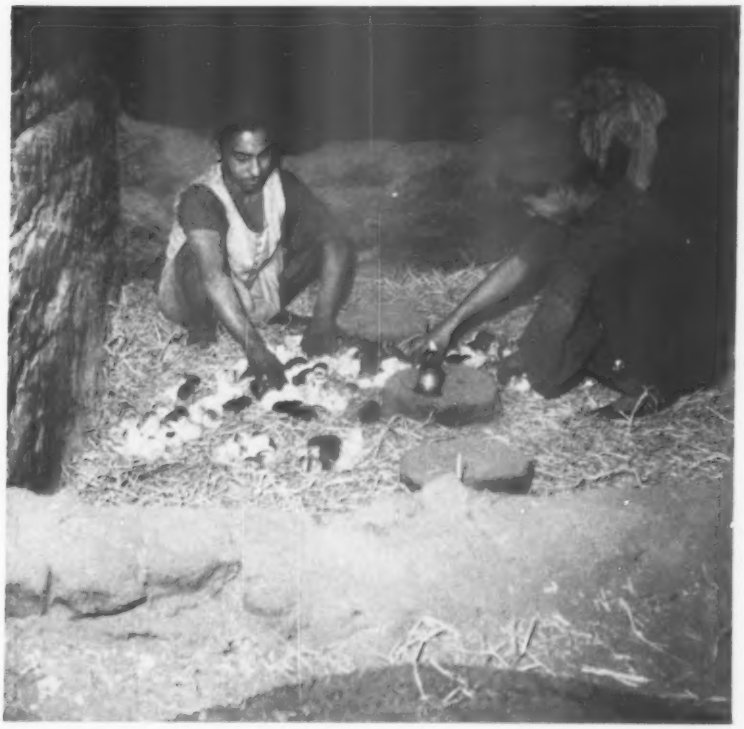


Hatchery operator tests egg temperature by holding an egg to his eyelid. His own sensitivity to changes in temperature is the only measure he has for regulating the heat in the hatchery.

jects conducted by several Egyptian institutions and agencies with the assistance of Point Four. Farmer-cooperators will be required to get rid of native cocks, report on diseases, and give back two eggs or one chick the following year for each chick received this year.

THE NATIVE HATCHERY IN A DISEASE CONTROL PROGRAM

Diseases of both humans and animals have always been widespread in the Nile Valley, where large numbers of people and animals are concentrated on a narrow strip of land. Poultry is no exception; disease is responsible for Egypt's having lost its extensive export market in eggs. The peak years for egg exportation were 1924 and 1932, when more than 200 million eggs were sold. Now none are exported. Official figures indicate that the poultry population of Egypt has dropped 40 percent in the past 15 years.

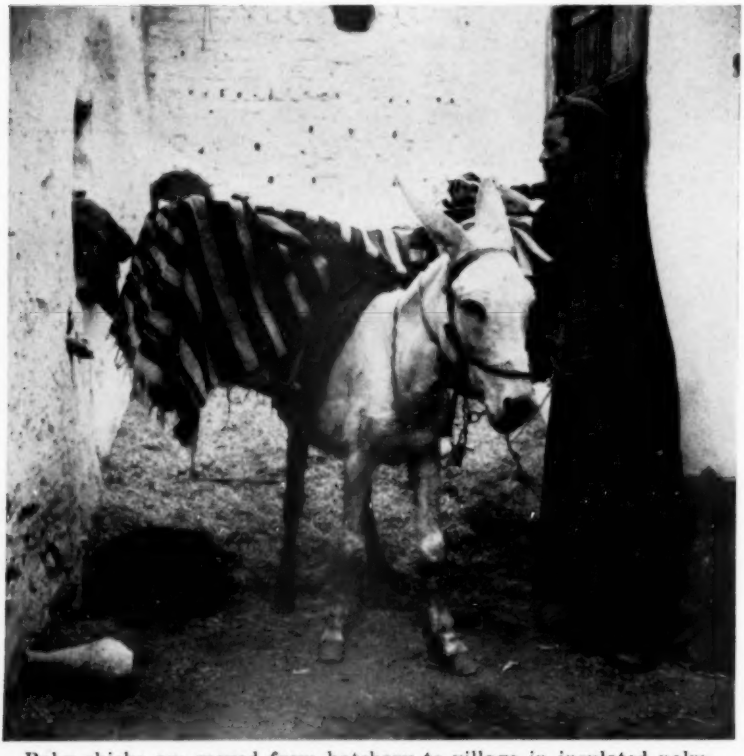


Chicks are kept in the central hallway until they are sold. Buyers have no selection in breeds; chicks are of mixed breeding. Note the elevated stepping stones.

Large flock owners have been especially concerned about the disease problem because their flocks are concentrated. The situation is perhaps more hopeful for the small poultry raiser whose few chickens are more isolated. Even many of them, however, have recently abandoned poultry production.

A concerted country-wide program of disease control is recognized as a major step toward restoring the poultry industry to its former place in the national economy.

The major unconquered disease of poultry in Egypt is Newcastle disease. Efficient vaccines are available and are being used in limited demonstration areas, where complete protection against the disease can be given. The vaccine cannot be given to baby chicks, however. If the newly developed intranasal vaccine now being produced in the United States were adopted in Egypt, 1-day-old chicks could be inoculated at the hatchery. In this way, hatchery operators would take part in the disease control program. Since their hatcheries



Baby chicks are moved from hatchery to village in insulated palm-branch crates.

are already supervised by the government, bringing the operators into the program would not be difficult.

With instruction, hatchery operators might also assist in the control of pullorum disease, as do operators of commercial hatcheries in other industries. Now, however, neither the farmers nor the hatchery operators in Egypt know enough about the disease and its control to participate in a control program.

FUTURE OF THE NATIVE HATCHERIES

The native Egyptian hatchery presents a unique opportunity for development of an educational and extension poultry program.

If the operators could be persuaded to participate in a short course on disease control, feeding practices, and the value of better genetic strains, conducted by some of the numerous well-trained Egyptian poultry scientists, the operators could serve as "extension agents" and pass on to small farmers information about good poultry management. When operators appreciated the need for proper diet for poultry and proper care of hatching eggs, they could help induce famers to adopt new ways that would benefit both farmers and hatcherymen. And they would correct the idea that percentage of hatch depends wholly on hatchery conditions.

In other ways also the native hatcheries could greatly assist in the development of the poultry industry. For instance, operators might adopt uniform practices in extending credit and in making agreements with contractors; such uniformity would be possible if hatchery operators had a trade-union type of organization sponsored by a government agency. And, if hatchery operators knew more about significant new developments in the poultry field and adopted them, they could raise their own incomes as well as help increase poultry production.

WANTED

Inquiries concerning the proceedings of the following previous World's Poultry Congresses have been recently received: Holland (1921) and Italy (1933). If any person has any of these Proceedings and would care to dispose of them please notify Dr. G. F. Heuser, Rice Hall, Ithaca, N. Y., U.S.A.

THE INCIDENCE AND CONTROL OF FOWL TYPHOID

GLENN SNOEYENBOS
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Amherst, Mass., U.S.A.

During 1952, fowl typhoid was identified on 26 farms in Massachusetts. Other evidence available indicates its presence on at least 11 additional farms. This is near the peak number of infections recognized in any one year, and no one pretends that there were not other infected flocks that were unrecognized or were considered by the owners to be "blue comb" or some other disturbance. It appears that this disease is increasing from year to year.

The various flock infections were studied rather closely in regard to the behavior of the disease and probable means of spread. Sixteen of the infected flocks and all of the flocks suspected of being infected were confined to four community outbreaks. In these outbreaks there was definite evidence that a single infected flock was responsible for spreading the infection to neighboring flocks. Two of these four flocks initiating community outbreaks contained infected birds since the previous year.

There were ten flock infections occurring in widely separated locations in three counties. Four of these ten infections were on premises known to be infected the previous year, (only one of these four flock owners made a real effort to eliminate the 1951 infection) two were on premises on which raw garbage was fed and one was next to a dump on which dead birds were thrown by unknown persons. The probable source of infection was not determined in the other cases.

Survivors of an acute outbreak of fowl typhoid may appear to be normal in all respects; they may lay well and suffer no apparent abnormal mortality. Flocks such as this are dangerous; infected birds almost always remain. An example of how extensively this infection may persist was shown by a flock recently tested. A group of 257 survivors of an acute outbreak almost four months earlier contained 186 (72 percent) reactors which were considered as carriers of fowl typhoid. Flocks such as this should be promptly slaughtered. The blood test is of practical value to determine the presence or absence of infection or to eliminate carrier birds if the incidence is very low. The test has no practical value during acute outbreaks of the disease. Under New England conditions, drugs are generally worse than useless for control.

Conscientious sanitation and management to prevent introduction of infections is the first line of defense against this disease. The second and no less important defense is based on early identification of infection and the prompt eradication of the disease by partial or completed population. (Feathered Fax)

GIZZARD WORM (STREPTOCARA PECTINIFERA) REPORTED IN FOWLS IN TURKEY

H. S. OYTUN

Department of Parisitolgy, Veterinary Faculty, University of Ankara, Turkey

Some helminths found in fowls of Elazing district and causing losses among adult fowls and young chickens were identified as *Streptocara pectinifera*. These helminths which are commonly found under the horny lining of the gizzard in the adult fowls and chickens and which cause a severe anemia, emaciation, loss of appetite, ulceration in the stomach and a loss of 50% among the infested fowls, were observed for the first time in Turkey.

The horny linings of the gizzards of the infested fowls were dark brown in color and hemorrhagic. There were hemorrhagic spots and lesions caused by the parasites.

This parasite is found under the horny lining of the gizzard in the fowl (Gallus gallus) and rarely in the turkey (Meleagris gallopova). In most cases they are numerous in number. Small nodules, ulcerations, and irregular spots 1-2 centimeters in diameter may be seen on the mucous membrane.

The nematode has occurred in France and Northern Belgium. It has also been reported in Southern Russia. It has now been seen for the first time at Sürüsürü village in Turkey. It is the agent of *Streptocarose* (Spirurose aviaire) which is a serious enzootical disease of poultry and causes a loss of 50 per cent among the infested fowls.

REVIEW OF POULTRY PUBLICATIONS

Compiled by J. W. Kinghorne,

1365 Iris St., N.W.

Washington 12, D.C., U.S.A.

GENETICS

AALIX, J.
LA DOCTRINE ADMINISTRATIVE EN MATIERE D' ELEVAGE DE BASSE-COUR. [MANAGEMENT IN POULTRY YARD BREEDING.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 123-124. 1952.—Profitable management requires limitation of the production of chicks; substitution of healthy purebred birds for the common flock, elimination, through banding, of 2-yr.-old layers; and periodical renovation of the flock to avoid degeneration and consanguinity.—*M. Claude* (Biological Abstracts)

BLYTH, J. S. S. (Poultry Res. Centre, West Mains Road, Edinburgh.)
LONGTIME TRENDS IN EGG PRODUCTION IN A CLOSED LINE OF FOWLS. *Proc. Roy. Soc. Edinburgh 65B(1):* 52-65. Illus. 1952.—In a closed line of brown Leghorns, between 1935 and 1949, no consistent change in annual March egg numbers or winter egg production to the end of that month, was evident. In birds with single-day interclutch gaps, however, the avg. March egg number showed an upward trend which paralleled the inverse curve for mean egg wt. except during the war yrs. This improving performance of birds in full production was accompanied by an increasing variance among them. The proportion of pausing birds also increased over the yrs. studied, but less regularly, and may have resulted from environmental causes. The consequences of the changes in rate and pausing encountered were discussed in regard to their effect on genetic variation in egg production.—*J. S. S. Blyth.* (Biological Abstracts)

BONNET, (Mlle.) A. (Agric. Household Sci. Nat. Sch., Coetlogon, France.)
LES ESPECES ET LES RACES. LES DINDONS. [SPECIES AND BREEDS. TURKEYS.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 25-28. Illus. 1952.—The main domestic breeds of turkey fall in 2 groups: French breeds: Black Common Turkey named according to the region: the Normandie or the Bourbonnais turkey; the White Common Turkey is its albino form; and the improved breeds Noir de Sologne, Rouse des Ardennes, Dindon Cuivré, and Dindon Gris Ardoisé. Foreign breeds include the British Norfolk Turkey, the American Broad Breasted Bronze, and the Beltsville White. Breeding may be extensive, birds being kept in fields, or intensive.—*M. Claude.* (Biological Abstracts)

BONNET, (Mlle.) A. (Agric. Household Sci. Nat. Sch. Coetlogon.)
LES ESPECES ET LES RACES. LA PINTADE. [SPECIES AND BREEDS. GUINEA FOWL.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 29. 1952.—Main vars. of this bird native from Africa, are the Blue, the Grey, the Lilac and the White. It cannot be bred in confinement.—*M. Claude.* (Biological Abstracts)

BONNET, (Mlle.) A.
LES ESPECES ET LES RACES. LE CANARD. [SPECIES AND BREEDS. THE DUCK.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 30-31. Illus. 1952.—All domestic ducks except the Barbary are descended from the wild duck *(Anasboschas sp.)*. The common duck differs from the wild species by its larger body and a more abundant egg-production. The breeds used for meat production are: French breeds—Rouen, Duclair (Rouen x Cayuga), and Nantais; foreign breeds—White Aylesbury, Pekin and Barbary. Ducks of the Runner breed are used as egg producers. The principal dual-purpose breeds are the Orpington and Khaki-Campbell. The duck is useful as a profitable consumer of various farm wastes, but increasing duck-raising does not seem advisable.—*M. Claude.* (Biological Abstracts)

BONNET, (Mlle.) A.
LES ESPECES ET LES RACES. LES OIES. [SPECIES AND BREEDS. GEESE.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 32-34. Illus. 1952.—The principal breeds descended from the ashy goose *(Anser cinereus)* are, in France, the common goose with its vars.—the Normandie, Beauce, Alsace, and Bresse; the Toulouse breed, with its 2 types, the industrial (the larger) and the agricultural; and the following foreign breeds: the Romagne, the Flamande, the Emdem and the Cygneus, with various types. Products are the down, the skins of the Poitou white breed, and the fatty livers of the Toulouse goose.—*M. Claude.* (Biological Abstracts)

BONNET, (Mlle.) A.
LES ESPECES ET LES RACES. LES PIGEONS. [SPECIES AND BREEDS. PIGEONS] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 34-35. 1952.—3 spp. of Columbidae are found in France: the Large Wood-pigeon, the Small Wood-pigeon, and the Rock-pigeon (from which the domestic pigeon is derived). The principal breeds of the domestic pigeons are the common pigeon, the Montauban, the Romain, the Caux, the Carmeau and the Mondain. Foreign breeds are the Lynx de Pologne, the Piacentini and the Sottobanca. Pigeon breeding is easy, but not very profitable.—*M. Claude.* (Biological Abstracts)

BOUDOL, A.
LA VOLAILLE DE BRESSE. [THE BRESSE FOWL.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 98-100. Illus. 1952.—The qualities of this breed—abundant meat of good tenderness and flavor—are dependent on its region of origin (its frail skeleton being related to the low Ca content of the Brasse soil), on its breed characteristics, and on the conditions surrounding its raising and fattening.—*M. Claude.* (Biological Abstracts)

CHARLET, P. (Nat. Agron. Inst., Versailles.)
LES ESPECES ET LES RACES. LES POULES. [SPECIES AND BREEDS. HENS.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 21-24. 1952.—Breeds of domestic fowl reared in France fall into the following groups: light breeds mainly kept for eggs: Leghorn, Black Bresse, Black Caussarde and Black Landaise: medium breeds, most numerous, intended for egg and meat production: Gatinaise, Bourbonnaise, White Wyandotte, White Bresse, Gasconne, Black Berry, Geline de Touraine, Black Vendée and Janzé; heavy breeds used mainly for egg laying: Marans, Rhode Island Red, New Hampshire, Sussex, Faverolles, Netherlands Blue, Plymouth Rock, and Orpington. Particular characteristics are given.—*M. Claude.* (Biological Abstracts)

DEMPSTER, EVERETT R., I. MICHAEL LERNER, and DOROTHY C. LOWRY. (U. California, Berkeley.)
CONTINUOUS SELECTION FOR EGG PRODUCTION IN POULTRY. *Genetics 37(6):* 593-708. 1952.—The results of selection for egg production in a flock of chickens are analyzed. The apparent decrease in rate of gain over the 16-yr. period is not statistically significant. No adverse effect of natural selection on gains realized is in evidence. Neither is there any indication that negative genetic correlations between rate

of lay and ability to survive or to reproduce have been induced. Heritability of the production index (hen-housed average) seems to have increased and become more additive, while that of the production of survivors of the 1st laying year may have decreased. It appears improbable that response to selection has ceased in this population and possible that gains are still being obtained at the rate characteristic of the early stages of selection in terms of selection intensity applied.—*Authors.* (Biological Abstracts)

GARBER, M. J., and C. B. GODBEY. (A. and M. Coll., College Station, Texas.)

THE INFLUENCE OF SIRE, DAM, AND HATCHING DATE ON SPECIFIC RATE OF GROWTH OF SINGLE COMB WHITE LEGHORN PULLETS FROM HATCHING TO TWELVE WEEKS OF AGE. *Poultry Sci. 31(6):* 945-955. 1952.—Study was made of gains of female offspring of random-bred pullet dams and cockerel sires over 10 weekly hatches beginning March 25, 1948. Analysis of variance and covariance was used to compute estimates of heritability (narrow sense) of sire and dam differences, the effects of variation in date of hatch and the residual environment. In decreasing order of importance they are: date of hatch, residual environment, dam, and sire. Sires and dams were ranked according to breeding worth by a comparable procedure. The concept of the average genotypic correlation between 2 randomly selected offspring of a sire is discussed with reference to their being full-sibs or half-sibs.—*M. J. Garber.* (Biological Abstracts)

GLAZENER, E. W., R. E. COMSTOCK, W. L. BLOW, R. S. DEARSTYNE, and C. H. BOSTIAN (N. Carolina Agric. Expt. Sta., Raleigh.)

CROSSBREEDING FOR EGG PRODUCTION. *Poultry Sci. 31(6):* 1078-1083. 1952.—Studies on crossbreeding were conducted over a 2-yr. period. The crossbreds and purebreds were half-sibs by the use of the artificial insemination technic. The greatest gains by crossing were in the number of days required for sexual maturity and in egg production. The data indicated somewhat higher incidence of broodiness in the crossbreds.—*Authors.* (Biological Abstracts)

KING, STEVEN C., and J. H. BRUCKNER. (Cornell U., Ithaca, N. Y.)

A COMPARATIVE ANALYSIS OF PUREBRED AND CROSSBRED POULTRY. *Poultry Sci. 31(6):* 1030-1036. 1952.—Barred Plymouth Rock and R. I. Red males were mated in single male matings to pens of mixed Barred Rock and Red females, so that their purebred and crossbred half sib progeny could be compared. Different strains of birds were used in each replication. The results of 6 replications of approx. 400 birds each showed highly significant heterosis for growth rate, age at first egg and egg production. Body wt. and viability during the brooding period were also significant, but fertility, hatchability, egg wt., broodiness, viability after the age of 6 weeks, and neoplasms did not show any evidence of heterosis. There was a significant sire effect on egg wt., which would indicate that sex-linkage was a factor in the inheritance of egg wt., in the particular strains we used. A possible sex-linked effect was also demonstrated for egg production, since the Barred Crossbreds were so consistently superior to the other matings used. The results emphasized the importance of testing several strains in reciprocal cross matings in order to find a combination which nicks well.—*S. C. King.* (Biological Abstracts)

KING, D. F., R. K. COLE, F. B. HUTT, and G. J. COTTIER.

TESTS IN DIFFERENT ENVIRONMENTS OF FOWLS GENETICALLY RESISTANT TO LEUCOSIS. *Poultry Sci. 31(6):* 1027-1029. 1952.—Two strains of White Leghorns bred for resistance to leucosis in New York and one similarly developed in Alabama were exchanged and maintained under controlled conditions at expt. stations in those 2 states. These 3 strains all maintained at the distant station the same comparatively high degree of resistance to leucosis that they demonstrated in their native states. Since the 2 stations are about 900 miles apart, one being 680 miles n. of the other, the results are considered as an indication that strains bred for resistance to leucosis in one locality

will prove useful in that respect in others.—*Auth. summ.* (Biological Abstracts)

MAW, A. J. G. (Pennsylvania State Coll., State College.)
UNIFORMITY OF TYPE IN BROILERS. *World's Poultry Sci. Jour. 8(4):* 281-285. 1952.—A 6-yr. study using males with up to 31-35% inbreeding reciprocally crossbred to random-bred females (Barred Plymouth Rock and New Hampshire) indicated slight or no effect on wt. uniformity or feed efficiency from the inbreeding.—*J. B. Christiansen.* (Biological Abstracts)

NEWCOMER, E. H. (U. Connecticut, Storrs), **and J. W. A. BRANT** (U. Illinois, Urbana.)
THE CHROMOSOMES OF THE DOMESTIC FOWL. *Poultry Sci. 31(5):* 929. 1952.—An abstract. (Biological Abstracts)

NORDSKOG, A. W., and A. J. WYATT. (Iowa State Coll., Ames.)
GENETIC IMPROVEMENT AS RELATED TO SIZE OF BREEDING OPERATIONS. *Poultry Sci. 31(6):* 1062-1066. 1952.—Size of breeding operations in terms of number of breeding pens has only a slight influence on possible genetic gains from selection unless the number is small. The advantages obtained from using many pens rapidly diminishes after the number reaches 20 or 30. When as many as 50 breeding pens are used practically all (about 98%) of the advantage due to the "large operation" factor is realized. Compared with selection intensity as a factor influencing selection pressure, size of operation is only a secondary force.—*A. W. Norskog.* (Biological Abstracts)

PHYSIOLOGY

AIRAN, J. W., and G. D. KALYANKAR.
MINERAL CONTENTS OF THE EGGS OF GUINEA-FOWL AND OF COMMON PIGEON. *Jour. Univ. Bombay 19(5) Sec. A:* 26-27. 1951. (Biological Abstracts)

FRONDA, F. M. and ATANACIO A. SIMON. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
THE POSSIBLE USE OF VARIOUS CHARACTERS IN SEXING NEWLY HATCHED LOS BANOS CANTONESE CHICKS. *Philippine Agriculturist 35:* 16-24. 1951.—Of the 821 Los Banos Cantonese chicks used in this study. 49.45 per cent were males and 50.55 per cent were females. There was a significantly greater number of females than males during the first six hours of hatching, about equal number of males and females during the second and third six hours, and a significantly greater number of males during the fourth six hours. Although the male Los Banos Cantonese chicks were significantly heavier at hatch than the females, the weight cannot be considered as a good basis for sexing newly hatched chicks. Similarly, the presence or absence of the head spot, the inclination of the comb, and the down color cannot be considered as good basis for sexing newly hatched Los Banos Cantonese chicks.

It was observed, however, that the primary feathers of the female Los Banos Cantonese chicks were significantly longer at the time of hatch, and grew considerably faster than those of the males. The length of the primary feathers may be used as a basis for sexing the three-day-old chicks.—*F. M. Fronda.*

FRONDA, ROBERTO E. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
THE INFLUENCE OF ARTIFICIAL ILLUMINATION ON THE EGG PRODUCTION OF NEW HAMPSHIRE YEARLING HENS. *Philippine Agriculturist 34:* 213-218. 1951.—Given artificial illumination from four o'clock in the morning to day light from October 16 to February 15 had no influence on the annual rate of egg production of New

Hampshire yearling hens, although it tended to hasten the onset of egg production after recovery from their annual molt. The results of the study tend to show that artificial illumination cannot be profitably used on yearling hens in this country.—*F. M. Fronda.*

GERICKE, A. M., and J. ERASMUS. (U. Pretoria, S. Africa.)
FEATHER MEASUREMENTS AND EGG PRODUCTION. *World's Poultry Sci. Jour. 8(4):* 271-276. 1952.—In White Leghorns and Black Australorps, the length of the shaft was a good index of total feather length, thus permitting accurate feather measurements without removing the feather. Narrowness in the back feather just in front of the preen gland tended to be associated with high production. The shaft length of the 10th primary gave somewhat inconsistent results as a production indicator, but tended to be short in birds with narrow feathers. Unusually long and wide feathers were associated with large birds and good production.—*J. B. Christiansen.* (Biological Abstracts)

GODFREY, EDWARD F., and R. GEORGE JAAP. (U. Tennessee, Knoxville.)
EVIDENCE OF BREED AND SEX DIFFERENCES IN THE WEIGHT OF CHICKS HATCHED FROM EGGS OF SIMILAR WEIGHTS. *Poultry Sci. 31(6):* 1108-1109. 1952.—A comparison of chick wts. (as expressed by "the percentage chick weight is of original egg weight") between Rose Comb Black Bantams, White and Barred Plymouth Rocks, and reciprocal crossbreds between the large and small breeds, indicated that there were statistically highly significant differences in chick wt. between breeds and sexes. While there were no differences in chick wt. between kinds hatched from Bantam eggs, pure-bred Plymouth Rock chicks utilized 1.84% to 2.09% more of the egg than did cross-bred chicks when both were hatched from Plymouth Rock eggs of similar wts. Similar comparisons within sexes indicated that males utilized, 1.46% to 1.61% more of the egg than females, From these results, it would apear that the genotype of the chick embryo may affect hatching wt. within each sex.—*E. F. Godfrey.* (Biological Abstracts)

HAYS, F. A. (U. Massachusetts, Amherst.)
EFFECTS OF AGE AT SEXUAL MATURITY ON BODY WEIGHT, EGG WEIGHT AND EGG PRODUCTION. *Poultry Sci. 31(6):* 1050-1054. 1952.—A population of 1317 pedigreed R. I. Red pullets hatched during a 3-year period was studied to gain information on 3 genetically important points. Since early sexual maturity responds well to selective breeding, it is desirable to find out possible effects on body wt., egg wt., and annual egg production. Very early-maturing pullets remained significantly smaller than medium or late maturing birds up to the age of 12 mos. This difference was eliminated at the age of 14 months when all age groups showed about the same body wt. The medium and late-maturing groups exhibited marked similarity in wt. after Dec. 1. The avg. mature wt. taken early in March did not differ significantly in the 3 age groups. Age at sexual maturity showed a consistent and significant effect on egg wt. in each month of the first laying yr. The mean annual egg wt. for the very early-maturing group was 57.89 g. (24.5 ounces); 58.78 g. (24.9 ounces) for medium group and 61.53 g. (26 ounces) for the late maturing group. Very early maturing pullets averaged a significantly greater number of eggs than did late-maturing pullets but not a greater number than was laid by medium-maturing birds. Economically, at least, it would seem to be advisable to breed R. I. Red pullets to become sexually mature at 140-189 days of age.—*F. A. Hays.* (Biological Abstracts)

HAYS, F. A. (U. Massachusetts, Amherst.)
SEX-DIMORPHISM IN TAIL LENGTH OF CHICKS AT TEN DAYS OF AGE. *Poultry Sci. 31(6):* 1093. 1952.—The study included 52 males and 138 females of the F_1 from White Leghorn males mated to R. I. Red females. The mean tail length in females was significantly greater than in males at 10 days of age. Tail measurements made on 119 male chicks and 352 female chicks of the R. I. Red breed also showed a similar difference between the sexes.—*F. A. Hays.* (Biological Abstracts)

HAYS, F. A. (U. Massachusetts, Amherst.)
SEX RATIO IN RHODE ISLAND RED CHICKS AT HATCHING. *Poultry Sci. 31(6):* 1094. 1952.—A detn. of sex ratio at hatching on 739 pedigreed R. I. Red chicks from 110 dams supports the idea that the embryonic death rate is higher in females than in males during the incubation period.—*F. A. Hays.* (Biological Abstracts)

McCARTNEY, MORLEY G. (Pennsylvania State Coll., State College.)
THE PHYSIOLOGY OF REPRODUCTION IN TURKEYS. 3. EFFECT OF FREQUENCY OF MATING AND SEMEN DOSAGE ON FERTILITY AND HATCHABILITY. *Poultry Sci. 31(5):* 878-881. 1952. —White Holland turkey pullets were mated: (1) with successive inseminations of 0.05 ml. of semen at intervals of 2, 4 and 6 weeks, and (2) with single inseminations of 0.05, 0.025, 0.0125 and 0.01 ml. to determine the relationship between frequency of mating and semen dosage on fertility and hatchability. Inseminations at intervals of 2, 4 and 6 weeks show that those from 2 to 4 or 6 weeks resulted in lower fertility, hatchability and poult production. These differences were highly significant. There were no differences in either degree or duration of fertility and hatchability between the groups inseminated with a single dose of 0.05, 0.025, 0.125 and 0.01 ml. of semen. Since turkeys produce relatively small amts. of semen, these results suggest that more efficient use of semen might be made by utilizing smaller doses.—*M. G. McCartney.* (Biological Abstracts)

OLSEN, M. W. (U. S. Dept. Agric., Beltsville, Md.)
INTRA-OVARIAN INSEMINATION IN THE DOMESTIC FOWL. *Jour. Exptl. Zool. 119(3):* 461-481. Illus. 1952.—Chicken spermatozoa, when applied directly to the surface of the ovaries of 4- to 17-wk.-old chickens, in some instances, are able to penetrate the young follicles and enter the ovum. In some prepns., follicles containing cell groups simulating holoblastic cleavage were found. Four eggs, apparently fertile were obtained from hens as long as 5-6 mos. after spermatozoa had been applied to their ovaries. Other eggs were encountered in which degenerative changes usual in infertile eggs had not occurred in the protoplasmic disc at the time of laying.—*Auth.* (courtesy Wistar Bibl. Serv.).

SHAKLEE, WILLIAM E., and C. S SHAFFNER. (U. Maryland, College Park.)
SELECTION FOR HIGH AND LOW THYROIDAL RESPONSE TO THIOURACIL FEEDING IN CHICKENS. *Poultry Sci. 31(5):* 935. 1952.—An abstract. (Biological Abstracts)

NUTRITION

ACKERSON, C. W., R. L. BORCHERS, and F. E. MUSSEHL. (U. Nebraska, Lincoln.)
THE UTILIZATION OF FOOD ELEMENTS BY GROWING CHICKS. XIV. EFFECT OF THE ADDITION OF VITAMIN B_{12} AND ANTIBIOTIC. *Poultry Sci. 31(6):* 1023-1026. 1952.—The feeding of vitamin B_{12} and aureomycin did not enhance the gains that resulted from the consumption of 900 g. of feed per chick from hatching to the approx. age of 5 weeks when raised on wire screens. When identical rations were fed to chicks raised on built-up litter the combination of B_{12} and aureomycin increased the growth rate at 8 weeks.—*Auth. summ.* (Biological Abstracts)

ANDERSON, G. W., J. D. CUNNINGHAM, and S. J. SLINGER. (Ontario Agric. Coll., Guelph, Canada.)
EFFECT OF PROTEIN LEVEL AND PENICILLIN ON GROWTH AND INTESTINAL FLORA OF CHICKENS. *Jour. Nutrition 47(2):* 175-189. 1952.—Groups of Barred Plymouth Rock male chicks were fed diets containing 17, 20, 23 and 26% protein in the presence of 10 ppm. of penicillin G potassium and in its absence. The birds

were weighed at 10 weeks of age and feed consumption was recorded. Representative birds from each group were sacrificed at the end of the xptl. period for pH and microfloral measurements of the cecal contents. Penicillin caused an increase in wt. and an improvement in feed efficiency with all levels of protein. It did not alter the requirement of protein but improved its utilization. It reduced the pH of the cecal contents considerably on all diets. The lactobacillus, aciduric, anaerobic and microaerophilic, aerobic and coliform types of organisms increased in number, the latter increase being due to the presence of an atypical strain of *Escherichia coli*. Enterococci counts were reduced by penicillin, at all levels of protein. The antibiotic effected a marked increase in the size of the ceca regardless of protein level. At levels up to 23% protein, a close correlation was noted between increased growth of the birds and increase in numbers of certain microorganisms.—*Auth.* (courtesy Wistar Bibl. Serv.).

BRAGG, DENVER D. (Virginia Polytechnic Inst., Blacksburg.)
AN ATTEMPT TO DETERMINE THE CAUSE OF CURLED OR DEFORMED TONGUES IN YOUNG BELTSVILLE WHITE TURKEYS. *Poultry Sci. 31(5):* 908. 1952.—An abstract. The incidence of the curled tongue condition is small at hatching time, and becomes greater among poults fed fine mash than among those fed a coarser type ration. Under normal growing conditions this deformity is apparently not caused by a deficiency of the amino acids—leucine, isoleucine, or phenylalamine —in poult diet. It was not prevented by the antibiotics, bacitracin or terramycin. Feeding poults pellets or the coarser mashes to 7 weeks of age produced greater body wt. and greater gain per unit of feed consumed than did the finer mashes. (Biological Abstracts)

BRANION, H. D., and D. C. HILL. (Ontario Agric. Coll., Guelph, Ontario.)
ANTIBIOTICS AND THE GROWTH OF GOSLINGS. *Poultry Sci. 31(6):* 1100-1102. 1952.—Aureomycin, diamine penicillin, procaine penicillin, streptomycin and terramycin, at a level of 50 ppm. in the ration, increased the growth and feed efficiency of goslings to 4 weeks of age in batteries. With one unexplained exception, the antibiotics also increased growth and feed efficiency from 4 to 8 weeks when the goslings were on grass range. All antibiotics improved feed efficiency to 8 weeks. —*H. Branion.* (Biological Abstracts)

BRANION, H. D., D. C. HILL, and I. MOTZOK. (Ontario Agric. Coll., Guelph, Ontario.)
EFFECT OF SUBCUTANEOUS IMPLANTATION OF BACITRACIN ON THE GROWTH OF CHICKS. *Poultry Sci. 31(6):* 1096-1098. 1952.—Subcut. implantation of a pellet containing 100 U. of bacitracin in the neck of newly hatched chicks had no ill effect, and no effect on growth or feed efficiency to 6 weeks.—*H. Branion.* (Biological Abstracts)

CAMP, A. A., and E. L. STEPHENSON. (U. Arkansas, Fayetteville, Ark.)
AN UNIDENTIFIED CHICK GROWTH FACTOR FOUND IN CORN HYDROL. *Poultry Sci. 31(5):* 910. 1952.—An abstract. (Biological Abstracts)

COOPERMAN, J. M., B. TABENKIN, and R. DRUCKER. (Hoffman-La Roche, Inc., Nutley, N. J.)
GROWTH RESPONSE AND VITAMIN B_{12} TISSUE LEVELS IN VITAMIN B_{12} DEFICIENT RATS AND CHICKS FED RIBOFLAVIN, 5,6-DIMETHYLBENZIMIDAZOLE AND RELATED COMPOUNDS. *Jour. Nutrition 46(4):* 467-478. 1952.—Riboflavin and a variety of synthetic compounds containing the 5,6-dimethylbenzimidazole moiety were tested for their growth-promoting ability in rats and chicks maintained on vit. B_{12} depletion diets. Of the compounds tested, 1-alpha-D-ribofuranosido-5,6-dimethylbenzimidazole was most potent, 1 mg. providing growth equivalent to that induced by 0.20 g. vit. B_{12} in the rat. Among the other compounds possessing activity were 1-beta-D-ribofuranosido-5,6-dimethylbenzimidazole, riboflavin, 1-(1'-D-ribityl)-5,6-dimethylbenzimidazole, 5,6-dimethylbenzimidazole, 1,2-dimethyl-4-amino-

5-ribitylaminobenzene, and 1,2-diamino-4,5-dimethylbenzene. The liver and kidneys of the rats and chicks fed adequate amts of vit. B_{12} had the largest stores of this vit. in the tissues. There was apparently no consistent correlation between growth and tissue stores of vit. B_{12} when the animals were fed several synthetic compounds. Digestion of the tissues with pancreatin or trypsin prior to assay resulted in markedly elevated vit. B_{12} microbiological assays and in microbiologically active material not destroyed by boiling in 0.2 *N* NaOH for 0.5 hr. Comparable values were obtained with *Lactobacillus lactis* Dorner utilizing an assay medium containing the cyanide ion as with *Lactobacillus leichmanii* grown in one containing a reducing agent.—*Auth.* (courtesy Wistar Bibl. Serv.).

DANSKY, L. M., and F. W. HILL. (Cornell U., Ithaca, N. Y.)
THE INFLUENCE OF DIETARY ENERGY LEVEL ON THE DISTRIBUTION OF FAT IN VARIOUS TISSUES OF THE GROWING CHICKEN. *Poultry Sci. 31(5):* 912. 1952.—An abstract. (Biological Abstracts)

DIETRICH, L. S., W. J. MONSON, and C. A. ELVEHJEM. (U. Wisconsin, Madison.)
STUDIES ON AN UNIDENTIFIED GROWTH FACTOR FOR CHICKS AND HYPERTHYROID RATS FED PURIFIED RATIONS. *Arch. Biochem. and Biophys. 38:* 91-96, 1952.—When fed a purified ration containing sucrose as the carbohydrate, the chick and the hyperthyroid rat require at least 1 additional factor for optimum growth. The factor is soluble in 70% and 95% ethanol, and stable to heat and alkali. It was not absorbed on Norit, was nondialyzable and was not precipitated by basic Pb acetate. Treatment with phosphotungstic acid caused loss of considerable activity. The factor was present in a wide range of natural products.—*Authors.* (Biological Abstracts)

DE LOS SANTOS, ALMARIO C. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
WATER-TREATED COPRA MEAL AS A PROTEIN SUPPLEMENT IN A RATION FOR GROWING CHICKS. *Philippine Agriculturist 34:* 174-177. 1951.—Five trials involving a total of 258 Los Banos Cantonese chicks were divided into two lots and given a similar ration except that in one lot, the copra meal was washed by soaking it in water for 24 hours and then dried with infra-red lamps after the steep water had been removed. The results obtained seem to show that the feeding value of copra meal is not improved by washing it with water.—*F. M. Fronda.*

ELAM, J. F., R. L. JACOBS, W. L. TIDWELL, and J. R. COUCH. (Texas Agric. Expt. Sta., College Station.)
POSSIBLE MECHANISMS INVOLVED IN THE GROWTH PROMOTING RESPONSES OBTAINED FROM ANTIBIOTICS. *Poultry Sci. 31(5):* 914-915. 1952.—An abstract. (Biological Abstracts)

FRONDA, F. M. and ILDEFONSO M. CRUZ. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
THE INFLUENCE OF RESTRICTED FEEDING ON PULLETS FROM 12 TO 24 WEEKS OLD. *Philippine Agriculturist 35:* 90-94. 1951.—The pullets raised by restricted feeding grew significantly slower than those fed liberally up to the end of the 24th week. After maturity, however, there was no significant difference between the selected birds from both groups which were given identical feeding and management from the 24th to the 28th week. There were no appreciable differences in the percentage of mortality and in the egg production of the selected pullets of the two groups. On the average, however, the pullets from the restricted group matured about one week earlier than those from the group fed *ad libitum.* The results of the experiment tend to show that a judicious restriction of feed may be practiced on growing pullets from 12 to 24 weeks of age, provided that a good pasture is made available for them.—*F. M. Fronda.*

GARCIA, PEDRO N., and F. M. FRONDA. (University of the Philippines, College of Agriculture, College, Laguna, Philippines).
WATER-TREATED IPIL-IPIL (LEUCAENA GLAUCA LINN.) SEED MEAL IN RATIONS FOR GROWING CHICKS. *Philippine Agriculturist 35:* 143-146. 1951.—The feeding value of water-treated ipil-ipil seed meal to growing chicks as supplementary ration did not cause growth depression. The toxic substance in the ipil-ipil seed meal may have been inactivated, transformed, partially removed, or completely washed away by simple water treatment and by drying with infra-red lamps. The mixture of 5 parts water-treated ipil-ipil seed meal and 15 parts fish meal, by weight, in rations for growing chicks produced as good results as the rations that contained 20 parts fish meal alone.—*F. M. Fronda.*

HARRIS, PHILIP L., and MARY L. QUAIFE.
VITAMIN E (ALPHA TOCOPHEROL) IN POULTRY NUTRITION. *Feedstuffs 24(46):* 20-22. 1952.—The symptoms of vitamin E deficiency in chicks are incoordinated movement and gait, prostration, and lying with legs outstretched and toes flexed. Damage to the brain and central nervous system causes these symptoms. Alpha tocopherol prevents these symptoms. In adult fowl, vitamin E deficiency results in degenerative changes in the testes of the male, resulting in permanent sterility, or the production of eggs with very low hatchability by the female. Methods of analyses for alpha tocopherol are difficult, and have been useful for only about two years. Even now, the methods are not satisfactory for some feedstuffs. Tocopherols occur in alpha, beta, gamma and delta form in natural feedstuffs, but only the alpha appears to be utilized by the chicken. Much of the alpha tocopherol in feeds is not available to rats or chicks. Cod liver oil and unsaturated fats are antagonistic. Xanthophyll may "spare" tocopherol. Alpha tocopherol is not stable and is destroyed rapidly in feeds, particularly ground feeds. Rapid growth may be a stress factor. Thyroprotein may also function as a stress factor.—*H. L. Wilcke.* (Biological Abstracts)

HEYWANG, BURT W., and H. R. BIRD. (U.S. Dept. Agric., Beltsville, Md.)
FAILURE OF SEVERAL AMINO COMPOUNDS AND OF SARDINE MEAL TO INACTIVATE GOSSYPOL IN DIETS OF BREEDING CHICKENS. *Poultry Sci. 31(5):* 805-809. 1952.—Five groups of White Leghorn pullets, selected because of the high hatchability of their eggs, were 1st fed a diet containing 30% cottonseed meal and 1.3% raw decorticated cottonseed as the source of 0.026% free gossypol. Four groups were later fed the diet supplemented with 0.8% DL lysine, 1% glycine, 0.5% 1-3 diamino propanol, or 0.5% urea as the source of amino groups, and the other group was fed the unsupplemented diet. Two other groups of White Leghorn pullets, also selected because of the high hatchability of their eggs, were first fed a diet containing 20% sardine meal. One group was later fed the diet supplemented with raw decorticated cottonseed as the source of 0.026% free gossypol, and the other group was fed the unsupplemented diet. Data on the hatchability of the eggs of the individual pullets in the different groups, and on discolorations attributable to gossypol in the yolks of their fresh eggs and eggs that were held in cold storage for 3 or 4 mos., show that the gossypol in the diets was not inactivated by the amino groups in the 4 compounds or by any component of the sardine meal, at least not to a sufficient extent to counteract the unfavorable effect on yolk color or hatchability.—*B. W. Heywang.* (Biological Abstracts)

HSU, JENG M., JOEL R. STERN, and JAMES McGINNIS. (State Coll. Washington, Pullman.)
EFFECT OF VITAMIN B_{12} ON PLASMA PROTEIN FRACTIONS IN CHICK BLOOD. *Poultry Sci. 31(5):* 921. 1952.—An abstract. (Biological Abstracts)

HSU, JENG MEIN, JOEL R. STERN, and JAMES McGINNIS. (State Coll. Washington, Pullman.)
THE EFFECT OF VITAMIN B_{12} DEFICIENCY ON ERYTHRO-

CYTE COUNTS AND HEMOGLOBIN LEVELS OF CHICK EMBRYO BLOOD. *Arch. Biochem. and Biophys. 38:* 261-266. 1952.— Expts. were conducted to investigate the effect of vit. B_{12} deficiency upon hemoglobin levels and erythrocyte counts in White Leghorn chicks and embryos. Hemoglobin and red cell counts on vit. B_{12}-supplemented embryo blood were higher than on blood of B_{12}-deficient embryos from the 18th-21st day of incubation. Vit. B_{12} injd. into the egg was as effective in raising embryo hemoglobin levels and red cell counts as B_{12} added to the diet of the laying hens. Terramycin added to a B_{12}-deficient diet for hens did not improve hemoglobin levels or erythrocyte counts in hatched chicks despite marked improvement in hatchability. The relation between B_{12}, terramycin, and hatchability is discussed.—*J. R. Stern.* (Biological Abstracts)

HSU, PENG-TUNG, and G. F. COMBS. (U. Maryland, College Park).
INFLUENCE OF VITAMIN B_{12} ON BLOOD LEVELS OF GLUCOSE AND NITROGEN-CONTAINING COMPOUNDS IN THE CHICK. *Arch. Biochem. and Biophys. 38:* 29-33. 1952.—A vit. B_{12} deficiency in chicks increased the blood levels of nonprotein N, amino N, urea N, creatinine, and glucose as compared with those of chicks receiving crystalline vit. B_{12}. The level of uric acid was not consistently affected. These findings suggest further that vit. B_{12} is involved in N metabolism in the chick.—*G. F. Combs.* (Biological Abstracts)

JOHNSON, ELTON L. (Iowa State Coll., Ames.)
PROVIDING VITAMIN B_{12}, ANTIBIOTIC AND UNKNOWN GROWTH FACTOR ACTIVITY FOR CHICK DIETS. *Poultry Sci. 31(6):* 955-961. 1952.—Vitamin B_{12} increased the growth and livability of chicks receiving diets devoid of animal protein. Antibiotics or dried whey resulted in further growth stimulation when the protein level of the diet was not more than 22%. The percentage growth responses obtained with these materials decreased as chick age increased. A combination of 4 antibiotics was not superior to penicillin alone. The possible relationship of these responses to unknown growth factors required by the chick is discussed. The protein requirement of the chick was affected by feeding either antibiotics or methionine. Condensed fish solubles produced a greater increase in growth of vitamin B_{12} deficient chicks than homogenized condensed fish. The difference between these marine products in improving the vegetable diet was shown to be due to the higher concn. of vitamin B_{12} in the fish solubles.—*E. L. Johnson.* (Biological Abstracts)

JOHNSON, E. L. (Iowa State Coll., Ames.)
PROTEIN QUALITY AND QUANTITY AND UNIDENTIFIED FACTORS IN POULTRY NUTRITION. *Feedstuffs 24(49):* 46-48. 1952. —Crude oils probably contain one or more unidentified growth factors for chicks. Oleic acid stimulated growth as much as 30% with the diets used. Growth effects were also obtained by feeding methyl oleate or methyl linoleate. Solvent-extracted soybean oil meal may be evaluated by chemical methods. A modification of the Caskey-Knapp urease test designed to measure released ammonia instead of urease is used to indicate under-heating, while fluorescence is used to indicate overheating. This method is not satisfactory for expeller meals. The feeding of underheated soybean meal to chicks resulted in delay in blood coagulation time at 4, 6, or 8 weeks of age, but this condition was corrected by feeding normal soybean meals. The anticoagulant in the meal was destroyed by autoclaving for 20 min. at 15 lbs. pressure. This factor was not vitamin K. Work with antibiotics indicated that protein was not spared to any marked extent by antibiotics and that combinations of four antibiotics were no better than penicillin alone.—*H. L. Wilcke.* (Biological Abstracts)

JONJO, EUGENIO A. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
EFFECTS OF EXTRA NIGHT FEEDING ON THE RATE OF GROWTH OF MALE DUCKLINGS. *Philippine Agriculturist 34:* 163-168. 1951.—In three trials involving a total of 600 male ducklings, one extra night feeding given at 11:00 o'clock in addition to the regular feedings given during the day increased slightly the rate of growth of

the ducklings. The slight increase in weight of these ducklings, however, does not warrant the practice in the production of green ducks.—*F. M. Fronda.*

KAISHIO, Y., and T. HASHIZUME.
ON THE FASTING CATABOLISM IN THE FOWL, "MIKAWA" COCK. [In Japanese with Eng. summ.] *Bull. Natl. Inst. Agric. Sci. [Yahagi, Japan] Ser G. 4.* 123-127. 1952.—To determine the fasting catabolism in the fowl by the C and N balance method, 4 cocks were used throughout a series of expts. carried out in 4 seasons under different environmental temps.: (1) from May-June, 1950, at 15-22°C; (2) from July-Aug. at 25-30°C; (3) from Sept.-Oct. at 15-22°C; and (4) from Jan.-Feb., 1951, at 7-12°C. Heat production in 24 hrs. was shown in the tables per kg. of body wt. and per sq. m. of body surface area. If daily heat production was assumed to be proportional to the body wt. (W^1), it was 68 Calories (C.) in winter, 56 C. in summer; if it varied with the body surface area ($W^{2/3}$), it was 80 C., 67 C. and 71 C., respectively. On the other hand, the latter was computed to be 759 C. in winter, 635 C. in spring and autumn and 673 C. in summer, if it varied with the body surface area.—*From auth. summ.* (Biological Abstracts)

KRATZER, F. H., M. P. STARR, D. M. REYNOLDS, and C. R. GRAU. (U. California, Davis.)
THE EFFECTS ON GROWTH OF CHICKS AND POULTS OF FEEDING YEAST ISOLATED FROM STREPTOMYCIN-FED POULTS. *Proc. Soc. Exptl. Biol. and Med. 81(1):* 312-315. 1952.—A 5- to 10-fold increase was noted in the yeast population of the intestinal contents of turkey poults when they were fed a ration containing streptomycin. Yeasts, including a strain tentatively identified as *Candida tropicalis*, were isolated from the intestinal contents and feces from the streptomycin-fed poults. Samples of the yeasts were grown in mass culture and were fed to chicks and poults. No consistent increase in growth resulted from the yeast supplementation, although slight increases were noted in some trials. The growth increases observed with the feeding of antibiotics apparently cannot be simulated by feeding the particular strains of yeast isolated.—*Authors.* (Biological Abstracts)

LEROY, A. M. (Nat. Agric. Inst., Versailles.)
L'ALIMENTATION DES ANIMAUX DE LA BASSE-COUR. [FEEDING THE POULTRY FLOCK.] *Bull. Tech. Inform. Ingenieurs Serv. Agric. 66:* 55-60. 1952.—The author discusses the maintenance, growth, fattening, reproduction, etc., of hens and rabbits, and rations suggested.—*M. Claude.* (Biological Abstracts)

LEWIS, R. W., and P. E. SANFORD. (Kansas State Coll., Manhattan, Kansas.)
USE OF EQUIVALENT LEVELS OF ANTIBIOTIC AND VITAMIN B_{12} SUPPLEMENTS WITH SOYBEAN AND COTTONSEED OIL MEAL DIETS. *Poultry Sci. 31(5):* 940. 1952.—An abstract. (Biological Abstracts)

LILLIE, ROBERT J., J. R. SIZEMORE, J. L. MULLIGAN, and H. R. BIRD. (U. S. D. A., Beltsville, Md.)
THYROPROTEIN AND FAT IN LAYING DIETS. *Poultry Sci. 31(6):* 1037-1042. Illus. 1952.—With R. I. Reds maintained in a multiple-unit laying house, different combinations of thyroprotein, lard, choline, dienestrol diacetate, and vit. B_{12} were fed in expt. 1 for a period of 22 mos.; different combinations of thyroprotein and fat were fed in expt. 2 for 11 mos. Thyroprotein did not increase egg production in either of the expts. with any of the dietary combinations. It decreased body wt. and feed efficiency. Inclusion of 8% lard in the diet resulted in an increase in body wt. and feed efficiency.—*R. J. Lillie.* (Biological Abstracts)

LILLIE, R. J., J. R. SIZEMORE, and H. R. BIRD. (Agric. Res. Admin., Beltsville.)
DEVELOPMENT OF A CHICK ASSAY FOR AN UNKNOWN

GROWTH FACTOR. *Poultry Sci. 31(5):* 923. 1952.—An abstract. (Biological Abstracts)

LINDBLAD, G. S., S. J. SLINGER, G. W. ANDERSON, and I. MOTZOK. (Ontario Agric. Coll., Guelph, Canada.)
EFFECT OF AUREOMYCIN ON THE CALCIUM AND PHOSPHORUS REQUIREMENTS OF CHICKS. *Poultry Sci. 31(5):* 923-924.—An abstract. (Biological Abstracts)

LIOANAG, ADOLFO, M. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
COPRA MEAL IN A RATION FOR GROWING DUCKLINGS. *Philippine Agriculturist 34:* 236-239. 1951.—Copra meal in the ration for growing male ducklings tended to retard their growth. Significant differences in weights, which showed the superiority of the ducklings that did not receive copra meal in their ration, were noted from the fourth week to the end of the experiment when the ducklings were 11 weeks old. The lot given copra meal was, however, financially more desirable than the other lot because its feed was cheaper.—*F. M. Fronda.*

MACAPAGAL, RAMON N. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
A STUDY OF TWO MASH MIXTURES FOR LAYING PULLETS. *Philippine Agriculturist 35:* 52-57. 1951.—One hundred young New Hampshire laying pullets were randomized into two lots of 50 pullets each. One lot was fed the College laying mash and the other was fed a laying mash imported from San Francisco, California. For egg production, the College laying mash was superior to the imported laying mash. The average feed consumption of each bird in both lots in one year was 32 kilograms. To produce one dozen eggs, however, the College laying mash required only 2.63 kilograms whereas the imported mash required 3.95 kilograms.—*F. M. Fronda.*

MAGRUDER, N. D., J. K. BLETNER, T. B. CLARK, C. E. WEAKLEY, Jr., and A. H. VANLANDINGHAM. (West Virginia U., Morgantown.)
THE VARIABLE RESPONSE OF NORMAL CHICKS TO "STRESS" RATIONS AND A VITAMIN B_{12} SUPPLEMENT. *Poultry Sci. 31(5):* 925. 1952.—An abstract. (Biological Abstracts)

MELLEN, W. J., F. W. HILL, and H. H. DUKES. (Cornell U., Ithaca, N. Y.)
EFFECT OF DIETARY ENERGY LEVEL ON THE BASAL METABOLISM OF GROWING CHICKENS. *Poultry Sci. 31(5):* 927. 1952.—An abstract. (Biological Abstracts)

MENGE, H., C. A. DENTON, R. J. LILLIE, and H. R. BIRD. (Agric. Res. Admin., Beltsville, Md.)
SOME PROPERTIES OF AN UNIDENTIFIED CHICK GROWTH FACTOR IN CONDENSED FISH SOLUBLES. *Poultry Sci. 31(5):* 927-928. 1952.—An abstract. (Biological Abstracts)

MENGE, H., and G. F. COMBS. (U. Maryland, College Park.)
STUDIES ON THE FRACTIONATION OF AN UNIDENTIFIED GROWTH FACTOR REQUIRED BY CHICKS AND POULTS. *Poultry Sci. 31(5):* 927. 1952.—An abstract. (Biological Abstracts)

NELSON, T. S., and H. M. SCOTT. (Illinois Agric. Expt. Sta., Urbana.)
THE EFFECT OF ANTIBIOTICS AND TYPE OF CARBOHYDRATE ON THE DIETARY NIACIN REQUIREMENT OF THE CHICK. *Poultry Sci. 31(5):* 929. 1952.—An abstract. (Biological Abstracts)

O'ROURKE, W. F., P. H. PHILLIPS, and W. W. CRAVENS. (U. Wisconsin, Madison.)
THE PHOSPHORUS REQUIREMENTS OF GROWING CHICKENS AS RELATED TO AGE. *Poultry Sci. 31(5):* 930. 1952.—An abstract. (Biological Abstracts)

O'ROURKE, W. F., P. H. PHILLIPS, and W. W. CRAVENS. (U. Wisconsin, Madison.)
THE PHOSPHORUS REQUIREMENTS OF GROWING CHICKENS AS RELATED TO AGE. *Poultry Sci. 31(6):* 962-966. 1952.—Expts. were conducted to determine the P requirements of the chick at different stages of growth. A purified ration was used to prevent complication due to the question of phytin P availability. Under the conditions of the expts., the P required by the chick decreased with increasing age. The minimum levels of P required were 0.43% to 3 weeks, 0.35% from 2-5 weeks and 0.27% from 4-10 weeks.—*Auth. summ.* (Biological Abstracts)

PEELER, H. T., and N. E. RODGERS. (Western Condensing Co., Appleton, Wis.)
EFFECT OF STREPTOTHRICIN ON CHICK GROWTH. *Poultry Sci. 31(6):* 1104-1105. 1952.—Streptothricin sulfate was not toxic at any of the levels fed to chicks receiving a diet of vegetable protein and cereal grain fortified with vitamins and minerals. An increased growth response to 100 ppm. of streptothricin sulfate compared favorably with that from 18 ppm. of a composite of equal parts of terramycin hydrochloride, aureomycin hydrochloride and procaine penicillin G.—*H. T. Peeler.* (Biological Abstracts)

PEPPER, W. F., S. J. SLINGER, and I. MOTZOK. (Ontario Agric. Coll., Guelph, Canada.)
EFFECT OF AUREOMYCIN ON THE MANGANESE REQUIREMENT OF CHICKS FED VARYING LEVELS OF SALT AND PHOSPHORUS. *Poultry Sci. 31(6):* 1054-1061. 1952.—The incidence of perosis in chicks fed low-Mn diets was reduced by dietary aureomycin. Chicks hatched from hens receiving penicillin weighed more at 5 weeks of age than similar chicks from hens not fed antibiotic. The carry-over effect was greater in chicks fed low-Mn diets than in those receiving higher levels of the mineral and was reduced by the presence of aureomycin in the chick diets. The requirement of the chick for added salt with a diet adequate in P was not greater than 0.25% under the conditions employed. Mn from technical grades of manganese sulfate and manganous oxide was just as effective as that from Mn $SO_4.H_2O$ of C.P. grade. The reduction in percentage bone ash caused by adding aureomycin to diets containing 0.41% inorganic P suggests that this level of P may not be adequate for maximum calcification in the presence of aureomycin.—*Auth. summ.* (Biological Abstracts)

PETERSEN, C. F., and C. E. LAMPMAN. (U. Idaho, Moscow.)
VALUE OF ANTIBIOTICS IN RATIONS FOR EGG PRODUCTION. *Poultry Sci. 31(6):* 1067-1069. 1952.—White Leghorn hens during the first yr. of egg production did not appear to be benefited by the feeding of antibiotics—penicillin, streptomycin, and terramycin—when added to a high-quality egg mash at 9 g. of any one antibiotic per ton of feed intake. The feeding of antibiotics did not increase % egg production, egg size, or body wt. Mortality was not reduced. Mortality from specific diseases including avian leukosis and blue comb was not benefited from the level fed. Duplicate groups of 70 hens each were fed diets containing each antibiotic and the hens were reared on built-up litter.—*C. F. Petersen.* (Biological Abstracts)

RINGROSE, R. C., and L. M. POTTER. (U. New Hampshire, Durham.)
METHIONINE, VITAMIN B_{12} AND FISH MEAL AS SUPPLEMENTS IN ALL-VEGETABLE CHICK STARTING RATION. *Poultry Sci. 31(5):* 932. 1952.—An abstract. (Biological Abstracts)

ROMOSER, G. L., MARY S. SHORB, and G. F. COMBS. (U. Maryland, Coll. Park.)
STUDIES ON MECHANISM OF ANTIBIOTICS IN PROMOTING CHICK GROWTH. *Poultry Sci. 31(5):* 932. 1952.—An abstract. (Biological Abstracts)

ROSENBERG, M. M., and A. L. PALAFAX. (U. Hawaii, Honolulu.)
LOW-GRADE SUGAR, A POTENTIAL CARBOHYDRATE FEEDSTUFF FOR LAYING CHICKENS. *Poultry Sci. 31(6):* 1110-1111. 1952.—Low-grade sugar, obtained from the 3d centrifugation of the heated, concd. cane juices (massecuite), was fed to New Hampshire pullets in graded concns. ranging from 32.25 to 56% of total ration for a period of 20 weeks. The group fed 32.25% low-grade sugar laid significantly more eggs and at a greater economy of feed conversion than did the controls. In addition, egg wt., body wt., and hatchability were not impaired at this concn. At the higher concns., body wt. was greatly increased and egg production was unaffected; while hatchability and economy of feed utilization were reduced. The reduction in feed efficiency may have been due, in part, to the tremendous increase in body wt. in the lots fed low-grade sugar at 45 and 56% of total ration. Because low-grade sugar is highly adherent and difficult to mix with conventional ingredients, it was combined with bagasse pith in the ratio of 10 to 1 by wt. and fed in this manner in trial 2. During the 20 weeks, the controls averaged 68.9% hen-day egg production, while lots fed this new feedstuff at 35.5% of the diet averaged 68.1 and 61%. The lots fed 49.0 and 57.5% sugar mix laid at a significantly lower rate. Although livability was not adversely affected by the exptl. rations, the efficiency of feed conversion tended to fall as the concn. of this carbohydrate feedstuff was increased.—*M. M. Rosenberg.* (Biological Abstracts)

SANFORD, P. E. (Kansas State Coll., Manhattan.)
EFFECT OF FEEDING CHICKS COMBINATIONS OF VITAMIN B_{12} AND VARIOUS ANTIBIOTIC FEEDING SUPPLEMENTS. *Poultry Sci. 31(5):* 933-934. 1952.—An abstract. (Biological Abstracts)

SAUTER, E. A., W. J. STADELMAN, and J. S. CARVER. (State Coll. Washington, Pullman.)
FACTORS AFFECTING THE INCIDENCE OF BLOOD SPOTS AND THEIR DETECTION IN HEN'S EGGS. *Poultry Sci. 31(6):* 1042-1049. 1952.—All eggs produced by a flock of 269 pullets during the first laying year were broken and observed for incidence of blood spots. The population was divided into 1 strain of White Leghorns and 3 strains of New Hampshires. Half of the pullets in each strain were fed each of 2 diets. The principal variation in diet was the inclusion of 10% alfalfa. A significant seasonal variation was observed. Similar seasonal trends were found in each of the 4 strains. Breed and strain differences in incidence of blood spots were found to be highly significant. The variation observed in the incidence of blood spots between hens on the 2 rations was found to be significant with the ration containing 10% alfalfa resulting in a lower incidence of blood spots.—*W. J. Stadelman.* (Biological Abstracts)

SAXENA, HARISH C., LAWRENCE R. BERG, and JAMES McGINNIS. (State Coll. Washington, Pullman.)
FACTORS AFFECTING THE GROWTH RESPONSE OF CHICKS AND TURKEY POULTS TO ANTIBIOTICS. *Poultry Sci. 31(6):* 1070-1074. 1952.—Two expts. were conducted with chicks kept in wire floored battery brooders and in floor pens with wood shavings litter to determine growth response to various levels of diamine penicillin and terramycin hydrochloride and combinations of both, under the 2 conditions of environment. The responses obtained with penicillin and terramycin and combinations were more consistent and greater for chicks kept in floor pens than for those kept in battery brooders. Diamine penicillin gave the best response under both environmental conditions. Combinations of the 2 antibiotics gave no greater growth response than penicillin alone. Two expts. were conducted with turkey poults kept in electrically heated battery brooders in which half of the wire floors ordinarily used were replaced by metal pans covered with wood shaving litter. The responses obtained in these 2 expts. were slightly greater to antibiotics when a litter floor was used than when the poults were kept on wire floor. In all cases, a highly significant growth response was obtained by addition of antibiotics. Although there was a greater and

more consistent growth response in poults kept on litter floor, the differences were not of sufficient magnitude to be statistically significant.—*H. C. Saxena.* (Biological Abstracts)

SERRAON, ANTONIO U. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
THE INFLUENCE OF DRIED RUMEN CONTENTS OF CATTLE ON THE RATE OF GROWTH OF CHICKS. *Philippine Agriculturist 35:* 83-85. 1951.—The addition of 10 parts dried rumen contents of cattle to 90 parts of a growing ration did not significantly increase the size of the chicks weaned at the age of 12 weeks, but the mortality was slightly lower than that of the chicks that received the basal diet. The slight advantage derived from the addition of dried rumen contents to the growing ration is not sufficient to justify its use.—*F. M. Fronda.*

SLINGER, S. J., W. F. PEPPER, D. C. HILL, and H. D. BRANION. (Ontario Agric. Coll., Guelph, Canada.)
EFFECT OF PENICILLIN ON THE GROWTH AND FEED EFFICIENCY OF CHICKS FED UREA. *Poultry Sci. 31(6):* 1106-1108. 1952.—Chick wts. were not improved by the addition of urea to diets suboptimal in protein level for growth either in the presence or absence of penicillin in the diet. In the absence of penicillin, the feed: gain ratio tended to be higher at higher levels of urea; in the presence of penicillin this effect was not observed.—*D. C. Hill.* (Biological Abstracts)

WAIBEL, PAUL E., M. L. SUNDE, C. A. BAUMANN, and W. W. CRAVENS. (U. Wisconsin, Madison.)
THE EFFECT OF ANTIBIOTICS ON GROWTH OF CHICKS FED RATIONS OF DIFFERENT COMPOSITION. *Poultry Sci. 31(5):* 938. 1952.—An abstract. (Biological Abstracts)

WILLIMON, CHARLES P., and C. L. MORGAN. (S. Carolina Agric. Expt. Sta., Clemson.)
THE EFFECT OF MINOR NUTRIENT MINERAL ELEMENTS IN THE DIET OF CHICKENS ON FEATHER PULLING AND CANNIBALISM. *Poultry Sci. 31(5):* 941. 1952.—An abstract. (Biological Abstracts)

YOUNG, R. J., M. B. GILLIS, and L. C. NORRIS. (Cornell U., Ithaca, N.Y.)
THE RESPONSE OF CHICKS TO AN UNIDENTIFIED FACTOR IN PEANUT MEAL. *Poultry Sci. 31(5):* 939. 1952.—An abstract. (Biological Abstracts)

POULTRY PRODUCTS AND MARKETING

BRANT, A. W., K. H. NORRIS, and GILBERT CHIN. (U.S. Dept. Agric., Beltsville, Md.)
A SPECTROPHOTOMETRIC METHOD FOR DETECTING BLOOD IN INTACT SHELL EGGS. *Poultry Sci. 31(5):* 908. 1952.—An abstract. (Biological Abstracts)

CARLIN, A. F., and JANIECE FOTH. (Iowa State Coll., Ames)
INTERIOR QUALITY AND FUNCTIONAL PROPERTIES OF OILED AND THERMOSTABILIZED SHELL EGGS BEFORE AND AFTER COMMERCIAL STORAGE. *Food Technol. 6(12):* 443-450. 1952.—The interior quality and functional properties of eggs thermostabilized in oil at 130, 134, and 136°F. for 16 min. and 144°F. for 8 min. were compared a few days after processing with untreated eggs and eggs oiled at 100 and 180° for 30 sec. Oiled and thermostabilized eggs were compared after commercial storage at 31° for 4, 6 and 8 mos. The interior quality of all eggs used in the functional tests was assessed by albumen index, yolk index and meat yield. Angel cakes, sponge cakes, plain cakes and custards were made to test the performance of the eggs

in baked products. The heat treatment produced an increase in the viscosity of the egg white which tended to improve the "fresh" appearance. The higher initial albumen index exhibited by the thermostabilized eggs was constant for the storage times tested. Although the oiled eggs had lower initial albumin indexes, there was no significant change during storage. Cakes made from eggs oiled at 100 and 180°F. for 30 sec. were similar in texture and vol. at the various storage periods. No deleterious effects of processing or storage were noted in the performance of either oiled or thermostabilized eggs in yolk sponge cakes, plain cakes and custards.—*A. F. Carlin.* (Biological Abstracts)

CONNER, J. W., E. S. SNYDER, and H. L. ORR. (Ontario Agric. Coll., Guelph, Ont., Canada.)
THE INFLUENCE OF WASHING AND OILING ON GRADE AND BACTERIAL CONTENT OF EGGS STORED FOR AN 8 MONTH PERIOD. *Poultry Sci. 31(5):* 939-940. 1952.—An abstract. (Biological Abstracts)

EARLE, WENDELL, and K. S. CARPENTER. (Cornell U., Ithaca, N. Y.)
COSTS AND RETURNS FROM PRODUCING HATCHING EGGS. *Poultry Sci. 31(5):* 913-914. 1952.—An abstract. (Biological Abstracts)

EVANS, ROBERT JOHN, J. A. DAVIDSON, DORIS BAUER, and HELEN A. BUTTS. (Michigan State Coll., East Lansing.)
CHANGES IN CONTENT OF NUTRIENTS IN SHELL EGGS DURING STORAGE. IV. BIOTIN, FOLIC ACID AND VITAMIN B_{12}. *Poultry Sci. 31(5):* 915. 1952.—An abstract. (Biological Abstracts)

EVANS, ROBERT JOHN, J. A. DAVIDSON, DORIS BAUER, and HELEN A. BUTTS. (Michigan State Coll., East Lansing.)
TRANSFER OF PROTEIN FROM WHITE TO YOLK DURING THE STORAGE OF SHELL EGGS PRODUCED BY HENS FED COTTONSEED OIL. *Poultry Sci. 31(5):* 915. 1952.—An abstract. (Biological Abstracts)

GABUTEN, ADRIANO R., and C. S. SHAFFNER. (U. Maryland, College Park.)
A STUDY OF THE PHYSIOLOGICAL MECHANISMS AFFECTING SPECIFIC GRAVITY OF CHICKEN EGGS. *Poultry Sci. 31(5):* 917. 1952.—An abstract. (Biological Abstracts)

HALES, K. C. (Refrigerated Cargo Res. Council, Cambridge, Eng.)
THE MARINE TRANSPORT OF BUTTER, EGGS AND CHEESE. *Chem. and Indust.* [*London*] *1952(31):* 747-749. 1952.—Maintaining good quality during shipment of butter, eggs and cheese requires precautions against absorption of foreign odors, excessive loss of moisture and conditions favoring growth of microorganisms. Temp. is the main factor to be controlled. Humidity control and proper packaging are also important.—*P. E. Ramstad.* (Biological Abstracts)

HARNS, J. VIVIAN, E. A. SAUTER, BARBARA A. McLAREN, and W. J. STADELMAN. (State Coll. Washington, Pullman.)
THE USE OF ANGEL FOOD CAKE TO TEST EGG WHITE QUALITY. *Poultry Sci. 31(6):* 1083-1087. 1952.—A series of 212 angel food cakes were prepared from eggs varying from day-old to 4 weeks of age. Cakes were evaluated by volume detn. and taste panel. There is a definite deterioration in quality of cake produced as the eggs used in its prepn. deteriorate in interior quality due to storage. A comparison was conducted between fresh and frozen cakes for taste panel evaluation. Angel food cakes could be frozen and held for short periods of time prior to evaluation by a taste panel without altering the results. —*W. J. Stadelman.* (Biological Abstracts)

KING, STEVEN C. (Cornell U. Agric. Expt. Sta., Ithaca, N. Y.)
EGG QUALITY STUDIES AT THE NEW YORK RANDOM SAMPLE TEST. *Poultry Sci. 31(5):* 940. 1952.—An abstract. (Biological Abstracts)

LORENZ, F. W. (U. California, Davis.)
A CRITIQUE OF SOME PHYSIOCHEMICAL METHODS FOR ESTIMATING THE AGE OF MARKET EGGS. *Poultry Sci. 31(5):* 924. 1952.—An abstract. (Biological Abstracts)

McNALLY, EDMUND H. (U.S. Dept. Agric., Beltsville, Md.)
EFFECT OF DRYING AFTER WASHING ON THE INCIDENCE OF EGGS INFECTED BY SPOILAGE MICRO-ORGANISMS. *Poultry Sci. 31(6):* 1102-1104. 1952.—Incidence of bacterial infection of shell eggs was detd. in eggs, washed-packed dry, washed-packed wet and unwashed eggs packed in dry fiber cases and with a wet flat in the case. The eggs were held at 41° and 68°F. for 3 months before breaking and culturing. The washed eggs packed wet and the unwashed eggs with a wet flat in the case held at 41° showed twice the number of infected eggs found in the unwashed dry and the washed-dryed eggs.—*Edmund McNally.* (Biological Abstracts)

MECCHI, E. P., A. A. KLOSE, and HANS LINEWEAVER. (Western Regional Res. Lab., Albany, California.)
FAT COMPOSITION OF CHICKEN AND TURKEY IN RELATION TO RANCIDITY DEVELOPMENT. *Poultry Sci. 31(5):* 927. 1952.—An abstract. (Biological Abstracts)

MUNRO, S. S. (Western Cooperative Hatcheries, Bellevue, Wash.)
EFFECT OF DIFFERENT FEED FORMULAS ON BLOOD-SPOTTING. *Poultry Sci. 31(5):* 929. 1952.—An abstract. (Biological Abstracts)

POUPARD, C.
L'OIE DE POITOU ET LA PRODUCTION DU "CYGNE." [THE POITOU GOOSE AND "CYGNE" PRODUCTION.] *Bull. Tech. Inform. Ingenieurs Serv. Agric. 66:* 101-103. Illus. 1952.—The breeding of white geese involves no special features, except that there are 3 pluckings before slaughtering and skinning. The plucked feathers must be kept very clean.—*M. Claude.* (Biological Abstracts)

RENAUD, A., and Y. COQUELIN.
L'ELEVAGE DE L'OIE ET LA PRODUCTION DU FOIE GRAS EN FRANCE. [GOOSE BREEDING AND THE PRODUCTION OF FATTY LIVER IN FRANCE.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 89-95. Illus. 1952.—Goose liver is produced in only 2 places—Central Europe (Hungary, Czechoslovakia, Rumania and Yugoslavia) and France. Each region produces about 400 tons annually. French goose livers of high quality weigh about 800-900 g.; those produced in central Europe weigh only 400-600 g. The Toulouse, the common goose, the Normandie, the Alsace, the Bourbonnais, the Gimont, the Masseube and the Landes breeds are used. In s.-w. France, goose-gorging is mostly carried on females, feeding them a white var. of corn at the rate of 15-40 kg. per goose; the livers so produced weigh about 850 g. In Alsace, livers weighing about 700 g. are produced by feeding the geese 3 times a day for about 3 weeks. Goose weight can be increased 1 kg. (of fat) with about 5 kg. of corn. Gorging can increase the liver fat content from the normal 2.5% to 40-60%, and the fatty liver may reach 1/10 to 1/6 of the body wt. High yields of fatty liver result from giving fresh, high quality feeds, and from the skill of the breeder.—*M. Claude.* (Biological Abstracts)

RINGROSE, ARTHUR T., and ERNEST F. WALLER. (Delaware Agric. Expt. Sta., Newark.)
THE INFLUENCE OF HANDLING METHODS ON BRUISES IN DRESSED BROILERS. *Poultry Sci. 31(5):* 932. 1952.—An abstract. (Biological Abstracts)

RYAN, F. A. (U. Connecticut, Storrs.)
OBSERVATIONS ON THE INTERIOR QUALITY OF EGGS LAID BY BIRDS IN THE STORRS EGG LAYING TEST. *Poultry Sci. 31(5):* 933. 1952.—An abstract. (Biological Abstracts)

STADELMAN, W. J., and MARTHA CYRUS. (State Coll. Washington, Pullman.)
EFFECT OF TIME AND TEMPERATURE ON LOSS OF EGG QUALITY. *Poultry Sci. 31(5):* 936. 1952.—An abstract. (Biological Abstracts)

STADELMAN, W. J. and E. A. SAUTER. (State Coll. Washington, Pullman.)
DETECTION OF HENS PRODUCING BLOOD AND MEAT SPOTS IN THEIR EGGS. *Poultry Sci. 31(5):* 936. 1952.—An abstract. (Biological Abstracts)

STOTTS, C. E., and M. I. DARROW. (Swift and Co., Chicago, Ill.)
YIELDS OF EDIBLE MEAT FROM CORNISH CROSSBREDS NON-CORNISH CROSSBREDS AND PUREBRED BROILERS. *Poultry Sci. 31(5):* 937. 1952.—An abstract. (Biological Abstracts)

SWANSON, MILO HARLAND.
A STUDY OF SOME PHYSICAL AND CHEMICAL CHANGES ASSOCIATED WITH THE STORAGE OF POULTRY MEAT. *111 p. Dissertation (Publ. 3642):* Univ. of Minnesota, 1952. Microfilm copy available from Univ. Microfilms, Ann Arbor, Mich., Pr. $1.39; enlargements 10c per page.—367 birds (chickens), including fryers, roasters, and fowl, were processed and packaged in a wrapping material and held in frozen storage at 0°F. for periods of 551-981 days. There was a close correlation between wt., color and bloom, and organoleptic score. The greater the wt. loss, the more extensive the freezer burn, the poorer was the color and bloom, and the lower the organoleptic score. Certain protein changes during frozen storage were studied. The following detns. were made on samples of breast and leg muscle taken from each fowl immediately following evisceration and again at 8-week intervals during the storage period: moisture; total N; water-soluble N; non-precipitable N; soluble free alpha-amino N; and non-precipitable alpha-amino N. Proteolysis was indicated during frozen storage by increases in soluble N and non-protein N of both leg and breast muscle. Assay for proteolytic activity was based on measuring by spectro-chemical analysis the increase in non-precipitable N. Opt. pH for hemoglobin hydrolysis was 3.25 to 3.50, and for autolysis of the enzyme prepn. itself, max. activity was at pH 3.50-3.75. The enzyme system was heat-labile. Holding the enzyme prepn. for 15 min. at 50°C. had little effect on its activity, but holding it at 60°C. for 15 min. reduced its activity by as much as 75%; holding at 70° virtually completed inactivation.—*Courtesy Dissertation Absts.*

SWANSON, M. H., and H. J. SLOAN. (U. Minnesota, St. Paul, Minn.)
SOME PROTEIN CHANGES IN STORED FROZEN POULTRY. *Poultry Sci. 31(5):* 938. 1952.—An abstract. (Biological Abstracts)

MANAGEMENT

BOUDOL, A., and (Mme.) FLAMENCOURT.
CONSEILS A UN JEUNE AVICULTEUR POUR L'INSTALLATION ET LA CONDUITE DE LA BASSE COUR. [SUGGESTIONS TO A YOUNG FARMER FOR THE ESTABLISHMENT AND MANAGEMENT OF THE POULTRY YARD.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 129-137. 1952.—Management, flock selection nutrition, hygiene, etc., are discussed.—*M. Claude.* (Biological Abstracts)

DAWSON, L. E., and J. P. WATTS. (Michigan State Coll., East Lansing.)
EFFECT OF NEST LITTER ON CLEANLINESS OF EGGS. *Poultry Sci. 31(5):* 913. 1952.—An abstract. (Biological Abstracts)

DE LA CRUZ, CRESCENCIANO F. and F. M. FRONDA. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
A COMPARATIVE STUDY OF THREE METHODS OF BROODING DUCKLINGS. *Philippine Agriculturist 35:* 47-51. 1951.—From the

results obtained in this study, it appears that the use of the sun porch offered no advantage over the ordinary method of brooding ducklings. This method consists of placing the ducklings in fireless brooding pens covered with a thick layer of rice hulls and provided with a small run. The battery brooder, however, may be used profitably in brooding ducklings to the weaning age of 10 weeks.—*F. M. Fronda.*

SKOGLUND, W. C. (U. New Hampshire, Durham.)
EFFECT OF BUILT UP LITTER ON COCCIDIA AND OTHER PARASITES. *World's Poultry Sci. Jour. 3(4):* 293. 1952.—Baby chicks started on re-used built up litter became heavily infested with coccidia, roundworms and capillaria. Weight gains were about the same as for birds started on new litter. These developed only coccidiosis. Birds raised in batteries and free from coccidiosis were heavier.—*J. B. Christiansen.* (Biological Abstracts)

TRINIDAD, LEVY A. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
THE FLOOR SPACE REQUIREMENTS OF LAYERS RAISED IN BATTERY CAGES. *Philippine Agriculturist 35:* 100-106. 1951.—In both S. C. White Leghorn and New Hampshire layers, for the most economical production of eggs, 2 square feet of floor space (1858.06 sq. cm.) for each layer proved the best. The amount and cost of feed necessary to produce a dozen eggs decreased as the floor space for each bird increased but the rate of mortality increased as the amount of floor space decreased.—*F. M. Fronda.*

GENERAL

PERO, R.
L'AMELIORATION DU CHEPTEL FERMIER. [IMPROVING THE POULTRY FLOCK.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 37-38. 1952.—The low mean egg-production (80 eggs per yr.) and the relatively long period (6 months or more) required on the farm to raise a commercial fowl, are due mostly to lack of specialization, need of selection, natural incubation, late hatching and large proportion of old hens.—*M. Claude.* (Biological Abstracts)

PERO, R.
LA RECHERCHE AVICOLE EN FRANCE. [POULTRY RESEARCH IN FRANCE.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 109-112. Illus. 1952.—The program of the Poultry Research Station of Jouy-en-Josas, Seine-et-Loire is discussed.—*M. Claude.* (Biological Abstracts)

POINTET, A.
L'ENSEIGNEMENT AVICOLE EN FRANCE. [INSTRUCTION IN POULTRY HUSBANDRY IN FRANCE.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 125-127. 1952.—Since 1949, the Ministry of Agriculture has established the Rambouillet Poultry School, which will enlist regular students of both sexes for a 1-yr. course, and also short-course students. Lectures are given on anatomy, physiology, genetics, nutrition, hygiene, diseases, breeding management, etc. of poultry. Exptl. and breeding centers have also been established.—*M. Claude.* (Biological Abstracts)

RIFFAULT, L. (Nat. Agric. Sch., Rouen.)
LA PLACE DE LA BASSE-COUR DANS L'AGRICULTURE FRANCAISE. [THE IMPORTANCE OF THE POULTRY INDUSTRY IN THE FRENCH AGRICULTURE.] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 5-19. Illus. 1952.—Each French farm has a poultry-yard, of which net returns are always valuable. Poultry production fluctuates; its production curve is about similar to that of cereals. Max. poultry production occurs in April, and the min. in Nov. In 1950, French poultry population was about 84,150,000 hens, valued at 42 milliards fr., 3,900,000 geese at 8 milliards fr., 5,200,000 ducks at less than 3 milliards fr., 2,300,000 turkeys at more than 5 milliards fr., 800,000 Guinea fowl at

500 millions fr., 9,100,000 pigeons at more than 2 milliards fr. and 41,000,000 rabbits at 20 milliards fr., yielding an annual income of about 180 milliards fr. Mean annual egg laying of hens is between 90-100 eggs, and the mortality rate between 20-22%. Poultry industry produces annually about 400,000 tons of meat and 300,000 tons of eggs.—*M. Claude.* (Biological Abstracts)

RIFFAULT, L. (Nat. Agric. Sch., Rennes, France.)
POUR ACCROITRE SA PRODUCTIVITE, L'AVICULTURE FRANCAISE PEUT-ELLE S'INSPIRER DES METHODES DES AVICULTEURS AMERICAINS? [TO INCREASE ITS PRODUCTIVITY, MAY THE FRENCH POULTRY INDUSTRY APPLY AMERICAN POULTRYMEN'S METHODS?] *Bull. Tech. Inform. Ingénieurs Serv. Agric. 66:* 113-122. Illus. 1952.—Improvement of the French poultry industry requires limitation of its objectives, production and marketing standardization, lowering of production costs, cooperative work between research and extension agencies, and prudent and limited concentration and specialization. The French poultry industry must therefore maintain its general structure, but may incorporate many technical elements and management methods already in use in the American poultry industry. —*M. Claude.* (Biological Abstracts)

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